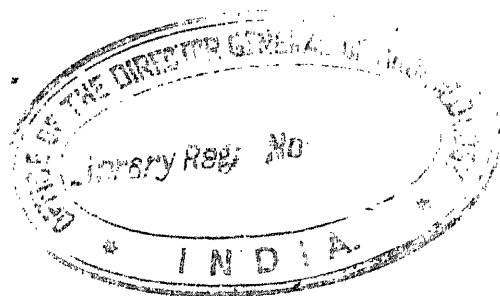


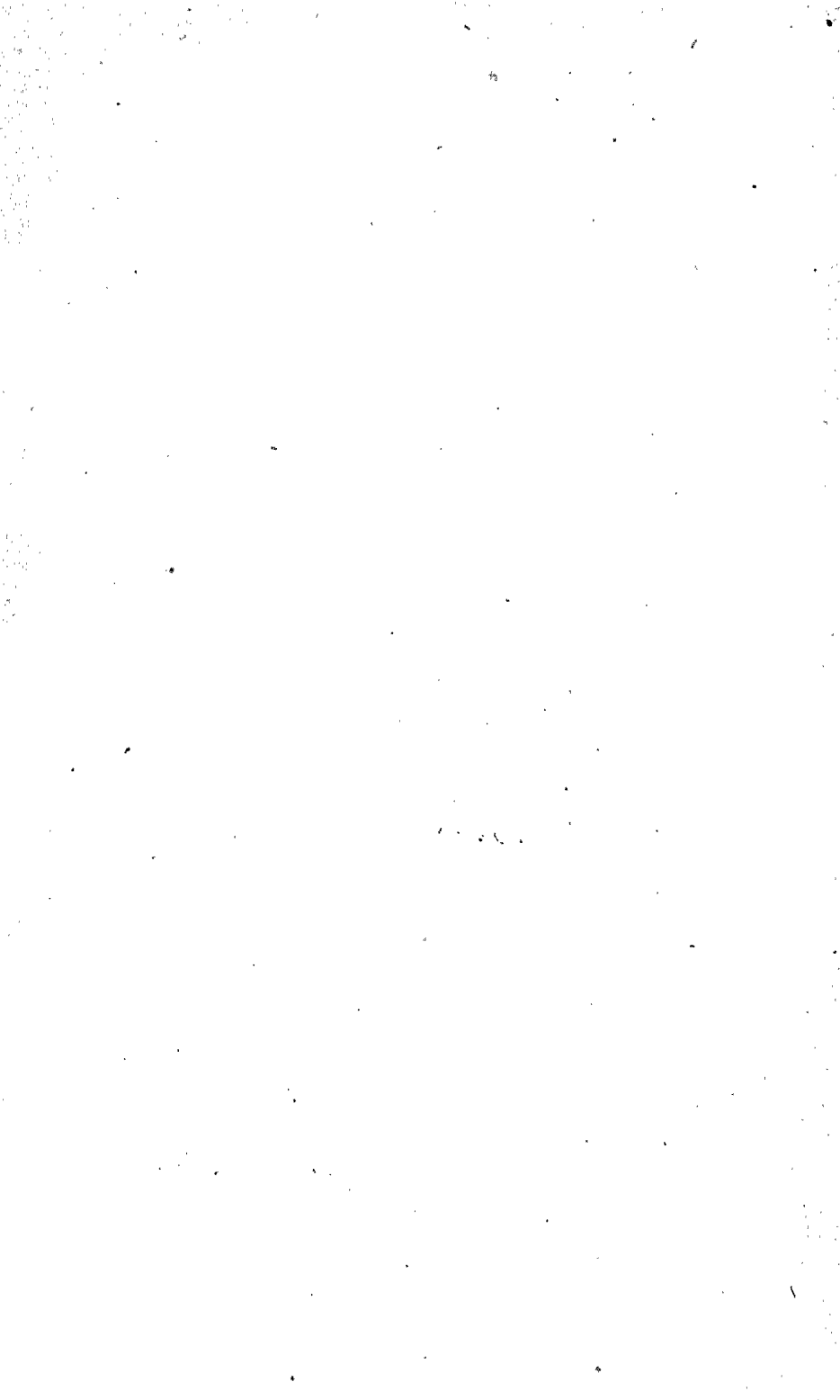
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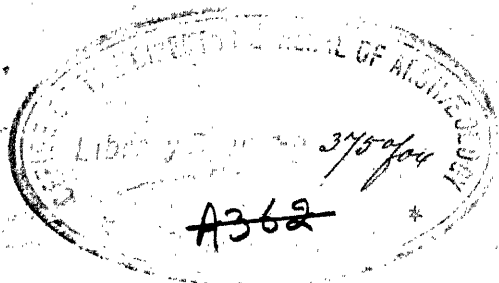
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JOURNAL  
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STRAITS BRANCH  
OF THE  
Royal Asiatic Society.

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JUNE 1899.

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J. M. B. R. A. S.

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PROCEEDINGS  
OF THE  
ANNUAL GENERAL MEETING,  
OF THE  
STRAITS BRANCH  
ROYAL ASIATIC SOCIETY,  
HELD AT THE  
RAFFLES MUSEUM, SINGAPORE.  
ON  
20th JANUARY 1899.

---

PRESENT:

H. E. SIR C. B. MITCHELL, *Patron*, Hon'ble W. R. COLLYER, *Vice President*, SIR A. SWETTENHAM, Messrs. BLAND, KNIGHT, NANSON, H. VAN PAPENDRECHT, DE VICQ, ST. CLAIR, Rev. W. G. SHELLABEAR, Dr. LUERING, Dr. HANITSCH, *Treasurer*, H. N. RIDLEY, *Secretary*.

The Minutes of the last general meeting were read and confirmed.

The Officers for the ensuing year were elected, *viz* :—

*President*.—Right Rev. BISHOP HOSE.

*Vice President (Singapore)*.—Hon'ble W. R. COLLYER.

„ *Penang*.—Hon'ble J. K. BIRCH.

*Secretary.*—H. N. RIDLEY, Esq.

*Treasurer.*—Dr. HANITSCH.

*Council.*—Mr. R. W. BLAND, Mr. A. KNIGHT, M. DE VICQ,  
Mr. W. G. ST. CLAIR, Rev. W. G. SHELLABEAR.

The Members elected by the Council during the previous year were formally elected.

The New Map was exhibited, and complementary copies were voted for Prince Dewawongse, for his assistance in the matter of Siamese territory, and for H. H. the Sultan of Johore for the use of the Map of Johore.

## Annual Report of the Council for 1898.

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The Council are happy to state that the financial position of the Society is in a very satisfactory state, and that, though there have been fewer members added to the Society than last year, the number of members keeps up to the average.

The members added were Mr. J. Driver, Mr A. L. Butler, Mr. J. Mason, Mr. J. E. Banks and Mr. J. B. Wood.

The Council have to regret the loss by death of Mr. A. H. Everett, who had been a member of the Society for eighteen years.

The proofs of the New Map were received in August, and were revised and returned by the Map Committee the same month. Steps have also been taken to copyright it. Copies for distribution are expected very shortly. The Government of the Straits Settlements renewed the vote of 1,000 dollars for aid in its publication.

One Journal (No. 31) was published, which contained a complete index of all papers published in the Journal since its commencement. Another is now in the Press and will be shortly in the hands of the Subscribers.

The Council are glad to see an increase in the number of Contributors to the Journal, and hope that this may be still more augmented.

A large number of pamphlets, books, and journals of kindred Societies have been received in exchange for copies of our own Journal and have been added to the library. A large number of books have been bound.

A Statement of Accounts by the Treasurer is appended.

Honorary Treasurer's Cash Account, for the Year ending 31st December, 1898.

Dr.

Cr.

1898	1898			
	\$	c.	\$	c.
To Balance in Chartered Bank	342	43	By American Mission Press	
Do. Mercantile Bank ...	278	61	for publication of Jour-	
With Hon Treasurer			nal No. 31 ...	436 29
(Mr. Anthonisz) ...	11	35	Advertisement ...	4 20
Subscriptions for 1896 ...	30	00	Commission to Collector	10 00
Do. 1897 ...	80	00	Book-binder ...	29 30
Do. 1898 ..	370	00	Clerk's Salary, (including	
Do. 1899 ...	20	00	December 1897,...	65 00
Life Member ...	50	00	Clerk's Petty Expenses	9 97
Sale of Journals ...	687	09	Postages on letters and	
Government Grant			Journals ...	25 98
towards the New Map ...	1000	00	J. van Cuylenberg for	
Interest on Cash Balance			preparing New Map	700 00
Chartered Bank ...	5	07	Telegram to England ...	20 25
Do. Mercantile Bank	13	70	Balance in Chartered	
			Bank ...	1337 50
			" Mercantile Bank ...	249 76
	\$ 2,888	25		
			\$	2,888 25

R. HANITSOH,

Honorary Treasurer, Straits Branch, Royal Asiatic Society.

## IN MEMORIAM.

SIR. W. E. MAXWELL, K. C. M. G.

Since its foundation in 1877, the Society has never sustained such a severe loss as that caused by the death of Sir William Maxwell, late governor of the Gold Coast.

Of his distinguished official career in this colony a very brief sketch will here suffice. From 1855 to 1869, he was employed in the Supreme Court, his father, Sir P. Benson Maxwell, being Chief Justice of the Colony. In 1867 he qualified as an advocate of the local bar, and for some years was a magistrate and commissioner of the Court of Request, acting for a short time as a judge of the Supreme Court of Penang. His legal attainments were of a high order, and qualified him to take the important part he did in the work of legislation, especially with regard to the Land question, to which he devoted his great abilities.

Appointed in 1874 Assistant Government Agent, Province Wellesley, he had his first opportunity of improving District administration. In the following year the Perak war took place, Mr. Maxwell serving as District commissioner with the Larut field force and being specially mentioned in despatches and receiving the Perak Medal. In 1878 he was appointed Assistant Resident, Perak, and it was during this period he gained his intimate knowledge of the Malays of the country—their language and folklore. In 1881 he was called to the bar (Inner Temple), and for some years after this, as Commissioner of land titles, he devoted himself to improving the land system in the Colony. The debates in the Legislative Council of this period and Reports on the Land Question shew what a complete mastery he had of the intricacies of land administration and legislation. In spite of determined opposition, he was able to carry out his policy, the good effects of which must now be admitted by his former critics. To him is due the system of District Administration which, started first in the Colony, has been reproduced with



such success in the Federated Malay States. After acting as Resident Councillor, Penang, from 1884 to 1889, Mr. Maxwell (who for his services in connection with the Nisero affair had been created a C. M. G.) was appointed in 1889 British Resident, Selangor, and in 1892 Colonial Secretary, S. S. After administering the Government here for some months, he was appointed Governor of the Gold Coast, where, after distinguished services in the Ashanti Expedition, he was made a K. C. M. G. His iron constitution was not proof against the deadly climate of the Coast, and he was cut off in the prime of life. The news of his death came as a great shock to his many friends in the Straits.

During his long career in the Colony and in the Native States, Sir W. Maxwell enjoyed exceptional opportunities of acquiring large stores of information on subjects of special interest to the Society. Of these opportunities he readily availed himself. A facile writer, his pen was never idle, and the hours which he could snatch from his all-absorbing official duties were devoted to literary work. His first contribution to the Society's journal was a paper on Malay Proverbs, written when he was Assistant Resident of Perak, and read at a meeting of the Society in May 1878. The second number of the Journal contained a further paper on the same subject, as well as "Notes on two Perak MSS." To the third number he contributed more work on Malay Proverbs, and on the Sakais and other aboriginal tribes of Perak. Soon after this, Sir W. Maxwell went home on leave; and his next contribution is to be found in the ninth number of the Society's Journal, which contains a most interesting paper, historical and geographical, entitled, "A journey on foot to the Patani Frontier in 1876" (67 pages), and another on the "History of Perak from native sources."

In 1883 he was unanimously elected to the honorary Secretaryship of the Society, and continued to hold that office till 1887, when, owing to absence from Singapore, he asked to be relieved of the arduous duties which it involved. During this period the Society owed its existence in a great measure to the energy of its Secretary, as it received but scanty support in the way of contributions from members. Sir William contributed papers on "The Dutch in Perak," on more "Malay Proverbs," and on "Shamanism in Perak," and on "The Laws and Customs

of the Malays with reference to the Tenure of Land." He also edited three Malay Fairy Tales, "Sri Rama," "Raja Donan," and "Raja Ambong," taken down by him from the lips of Malay rhapsodists, and published with a translation and with notes from his pen. In 1893 he was elected Vice President of the Society, and his official duties as Colonial Secretary from this time forward prevented his contributing to the Journal, though he continued to take the liveliest interest in the Society's work, and was able in many ways to give it material assistance.

The work he did for the Society is not, however, to be only judged by what he did under its auspices and in its name. He contributed to the Royal Asiatic Society's journal some interesting notes on Malay legends, and he wrote a Manual of the Malay Language which has done much to facilitate a scholarly acquisition of the idioms in which he took so deep an interest. He was in some measure acquainted with Arabic and Sanskrit, but will best be remembered for his work in connection with the indigenous elements of the Malay Language, its traditions and folk-lore. He collected a fine library of Malay MSS., which he has bequeathed to the Royal Asiatic Society. A great advocate of scholarly method, he did much to draw attention to the material that exists, in Dutch and other foreign languages, for the proper study of Malay. Indeed it was his view that an intending student of Malay should commence by learning Dutch; and there is no doubt that, with our limited literature on local subjects, his advice is worthy of consideration. That he was much influenced by Dutch scholars is often clearly traceable in his writings; and he had frequently to fight single-handed in defence of views which anyone acquainted with Dutch studies on the subjects would have at once admitted to be sound.

It is most difficult to exactly measure the extent of Sir William Maxwell's influence, as a scholar, upon his contemporaries and successors. He is constantly referred to by Dutch writers, and (except on one point) always with authority. His work on Malay Proverbs drew attention to the possibilities of a most interesting study, and led to the publication of at least one other valuable contribution on the same subject, from the pen of Mr. H. Clifford. His edition of Malay Rhapsodist tales also

attracted the notice of scholars to a literature which, being unwritten, is all the more likely to perish. It is noticeable in this respect that the fourth tale alluded to by Sir W. Maxwell, but never published by him, has been placed on record by Mr. Clifford, and published by the Society. It is however by his "Manual" that he is likely to have exercised his widest influence, in that he introduces every learner of Malay to a scholarly appreciation of Malay style and language, when all the learner's surroundings tend to degrade that language in his eyes. In his inaugural address on the foundation of the Straits Asiatic Society, the President, speaking of Logan's Journal, remarked that the weak point in that brave attempt was that the Editor was alone responsible for the management of his Journal, and that he was forced to give up, for want of sufficient co-operation, a work which was beyond the power of a single man to sustain. Is this to be true of the work of the Straits Asiatic Society? The President expressed a hope that the work of a Society might possess more permanence than that of an individual. "Individuals," said he, "are removed, but others remain." Nevertheless bearing in mind the limited range of interest in the Society's work, and the difficulty of securing contributors, any one who has been familiar with the Society's history from the first must feel how much depends on one man, and how much must have fallen on Sir William Maxwell in the past. The work done has been in a great measure his own work; and although there is fortunately no need to anticipate any abandonment of the aims which he did so much to forward, it is impossible either to minimize the extent of the Society's loss, or to believe that without increased effort on the part of members it will be possible to maintain in future numbers of the Journal the standard which the late Sir William Maxwell set.

C. W. S. K.

## An Unexplored Corner of Pahang.

---

The Pahang River, as most people interested in Pahang affairs know, is the great artery which serves to keep Ulu Pahang in touch with the outer world.

Up it in large numbers, pass the Malay and (of late) Chinese boats, laden with supplies for the shops of Kuala Lipis, Punjom and Silensing, machinery for the mines, and from time to time those Europeans, whose business takes them into the Ulu.

From the main stream, branch off tributaries almost as large as the parent river, to the left the Semantan, up which most of the heavy stores and machinery for the mine and town of Raub passes, and which with its tributaries taps a large belt of country, including the Bentong tin bearing district.

Two or three days farther poling and the Tembeling goes off to the right, at the Kuala of which is situated the grave of the late E. A. Wise, who was unfortunately killed in the attack on Jeram Ampai stockade. He was a young man of great promise, a favourite with both Europeans and natives, and adds one more to the list of bright young fellows who have died in foreign lands on her Majesty's Service.

It was up the Tembeling that Baron Miklucho Maklay, one of the earliest Pahang explorers, made his way over into Kelantan, and from there down the Kelantan River to Kota Bahru, the capital of Kelantan.

That gentleman, whom I had the pleasure of meeting many years ago in Queensland, devoted his life and large income to exploring, and making an ethnological collection.

When I met him in Queensland, he was in quest of the skulls of a hairless tribe of natives, said to have been met with

in the "Back country," and he also succeeded in obtaining the skull of a notorious aboriginal outlaw, who had been recently executed. I remember he was particularly keen on this skull, as it was said to possess some abnormal measurements. An account of Baron Maklay's trip through Pahang, with copious notes on Sakei Ethnology, will be found in one of the early "Transactions" of the Straits Asiatic Society.

From beyond Kuala Tembeling, the Pahang River takes the name of the Jelai. The Lipis River branches off to the left at the town of that name, and some ten miles up is the landing for the Punjom Mine, while up towards its Ulu, it divides into many separate streams, chief among which are the Wong and the Semantan Ulu, which latter is formed by the united streams of the Simpam and Siang; from the former of which Raub Mine is taking its electric power, and on the latter the Liang Coffee Concession is situated.

From Kuala Lipis to Kuala Medang, the farthest point of European enterprise on the Jelai, is about 25 miles, and midway between Kuala Lipis and there, the Telang river comes in on the left, and is utilised by the No. 2 Concession of the M. P. Exploration Co. for getting supplies up to their property. It is only navigable for boats however, and villages are few and far between. A couple of miles farther up the Jelai, the Tanom comes in on the right, close to the residence of the Toh Rajah of Jelai. A great deal of alluvial gold working has been done in former times some distance up this river, in fact it was important enough at one time to have a "Kapitan China," but no reefs have been found.

Kuala Medang is the landing for the Silensing mines, and the last point of European settlement on the Jelai, in fact the Europeans who have been higher up than that, can be counted on one's fingers. The Medang, from which the landing takes its name, is merely a dirty little creek that would not float a boat. Like most of these places, it has its own legend, which was told me in all seriousness by an old Malay. Questioning him as to how the place came to be named Kuala Medang, he explained that a very long time ago, when it was a flourishing Malay village, a man lived there who had a boat

made of Medang timber. This man was fortunate enough to kill a Dragon, of which according to him there was only a very limited supply even then. He skinned it, and nailed the skin as a sort of sheathing round his boat, which had the effect of vastly increasing its speed so that a trip to Pekan and back, which in these effete times takes about a month, used to be accomplished in 24 hours. This lasted for some time, but one night, lying at anchor, the boat sank, and could never afterwards be found. It also seems that shortly after this, a close season was proclaimed for Dragons, and no more skins could be obtained, which was unfortunate, to say the least of it.

About half an hour's poling above Kuala Medang, the dismemberment of the Jelai begins, the Anak Jelai as it is called going off to the left, taking a S. W. course. A little farther up, the main stream divides again, the Seran going to the right or N. E., and the Telom going straight on or about due North. The Telom is much the larger stream of the three, and under ordinary conditions should still retain the name of Jelai. According to my ancient Malay friend, however, when the prehistoric geographers were naming these rivers, some little discussion arose among them as to which of the three should retain the name of Jelai, and to settle the matter they decided to weigh a given quantity of water from each, and the water from the left hand branch proving the heaviest, it retained the name. The Seran, from where it branches off to the right, keeps a pretty general N. E. bearing for a day and a half's poling, when Kuala Besi is reached. Then it divides again, the Seran keeping about its old course, while Sungei Besi bears slightly west of north, and its head waters get round very close to the head waters of the Telom. The Seran forms the highway to Kelantan and hundreds of Kelantan coolies pass up and down to work at the Silensing mines, there being a short day's tramp after leaving navigable water to get over the Dinding Range.

So far, I can only learn of three Europeans who have been over that route, and none who prior to my trip had been up Sungei Besi.

From the junction of the Telom and Seran up to Kuala

Besi, there are a few Malay houses at long intervals, but above that there are none whatever, the whole of it being Sakei country. There is evidence however of ancient native settlement on a large scale, as there are groves of Durian and other fruit trees, now grown to the size of the other jungle trees, where doubtless the villages originally stood. None of the Malays of the present day seem to have any idea as to who were the ancient inhabitants, or what was the cause of the exodus. It is also a noticeable fact that above Kuala Besi the names of rivers, mountains, etc., are all Sakei. The land on each side of the Seran is of much better quality than the general run of land in Pahang, and the paucity of settlements on it is remarkable.

About 8 hours poling above Kuala Besi, and toiling along slowly in a boat, against a rather rapid current, a huge mass of what I at first took to be smoke or fog loomed up among the trees on the right bank. To my surprise on getting closer, I found it to be a huge isolated Tor of limestone, fully 400 feet high, the face of the cliff being quite perpendicular and snowy white. I then remembered that on one occasion, looking from the top of a high hill near the Silensing mine with a strong pair of glasses, we had made out a huge white mass in that direction, and many were our conjectures as to what it could be. Here was the mystery solved! About 50 feet up from the face of the cliff, I found a cave open to the front, capable of holding two to three hundred people, which is used as a camping ground by the Sakeis when out hunting, the limestone being blackened by the camp-fires of ages.

The sight of this vast natural monument, so different to the ordinary monotony of the Pahang jungle, was so absorbing, that it was long ere I could leave it. There is a similar cliff at the upstream end of the Tor, so that the view whether going up or down stream, is equally grand, and deep were my regrets that I had left my camera at home, and so could not get some photographs of it. The native name of this cliff is Gua Bumit.

About two hours' poling above that, a small stream, called Sungei Chok, comes in on the right bank, and there navigation ceases, or at least ought to, for to take a boat farther up,

is chiefly labour and sorrow, at least as far as coolies are concerned. Sungei Chok is not possible for a boat, but a day's jungle tramp (say about 20 miles) towards its Ulu, brings one to another limestone pile, of much greater dimensions. Its name is Gua Senoorat, it is from 1,500 to 2,000 feet high, and has a cave at its base capable of holding a couple of thousand people.

Doubtless in the fulness of time, when Kuala Lipis becomes the seat of Government and Europeans become more plentiful in the Ulu, these huge natural monuments will be more closely examined, but it will always be a source of satisfaction to feel that I was the first European to gaze upon them. What millions of years must have elapsed and what mighty changes must geologically speaking have occurred, since those huge beds were laid down in the ocean, and then slowly eroded and dissolved by the carbonic acid of the fresh water, after the ocean retreated, leaving only these isolated pinnacles to speak of what was once a continuous bed of limestone. The decomposition of this limestone doubtless has much to say for the better quality of the land on the Seran, of which I made mention earlier.

Leaving Kuala Chok, two hours poling brings one to Jeram Rimau, and though it is possible to drag an empty boat through it as I did, still future travellers would be well advised to make a camp, and leave their boat below it, and do any further travelling towards the Ulu on foot, for a short distance above the Jeram the river divides again into two streams which are both very shallow.

The right hand branch is still Sungei Besi, and the left hand one Sungei Wur, the waters of which I find almost join the head waters of the Telom, heading from opposite sides of the same spur. One day's tramp up either of these streams, brings one to the base of the main dividing range, on the other side of which is Kelantan.

After having my boat dragged through, and my baggage carried round the Jeram, I found it impossible to take the boat farther, and so made a camp at the junction of the two streams.

On the left bank of Jeram Rimau is a mountain fully 1,000 feet high, which the natives call Bukit Guroh, and to



which all sorts of legends appertain. It is chiefly a mass of huge rocks, and the Sakeis of that locality have a record of over 60 of their tribe who have been killed by tigers on it. The evening I camped there, a Sakei, who formed one of my party, went about 150 yards below the camp to fish, and while so engaged a tiger came out of the jungle at the base of the mountain and sat on a rock about 50 yards away. The Sakei abandoned his fishing lines and made for the camp yelling, and the tiger went back into the jungle. As a precautionary measure, I had a large fire built and kept going all night.

Next day, leaving a couple of coolies in charge of the camp, I tramped about ten miles up Sungei Besi, and came to a large Sakei clearing on a right hand branch known as Sungei Seringat.

The whole party were away on a hunting expedition to Ulu Telom, but I learned there were ordinarily about 50 of them lived there, and we occupied their houses for the night. The only thing worthy of note to be seen in them, was a string of jawbones, with the teeth intact, of several dozen monkeys in each house, hung up in the smoke above the fireplace. There were all sizes and kinds, and it is evident the Sakei when hungry spares neither age nor sex of the monkey tribe. Every monkey they kill and eat, they add his jawbone to the string, and when they are unsuccessful in hunting it is said they derive great satisfaction from gazing at and thinking over these mementos of former repasts. They have a clearing of a good many acres at Kuala Seringat, planted with plantains and paddy, and would seem to have been there for several years.

There is said to be tin in the streams farther on, close to the base of the dividing range, which is probably the case, but neither Malays or Chinese care to venture so far by themselves, as the Sakeis are said to be wicked, while the cost of getting supplies would be great, and the area is also probably limited.

From one of the hills at the Sakei clearing, a magnificent view was obtained of the limestone mountain, Gua Senoorat, distant about 20 miles. There would seem to be a large belt of

nearly flat country between Sungei Besi and Sungei Seran, as this mountain stands up as it were alone. Having seen all I wished to see in that locality, I came back to my camp at Kuala Wur, and had my boats and baggage taken below the Jeram, and there stayed the night. There was a rise of several feet in the river that night, and next day we came down to Kuala Besi at racing speed, doing in six hours, what it had taken us three days to go up.

I stayed the night at the house of an old Malay friend named Johor, and sitting chatting with him far into the night, he gave me the details of a tragedy which happened in his younger days, which, had a European been the chief actor, would have been cabled all over the world. Johor is now an old man, his wife is an old woman, and the two children who as infants took an unconscious part in the tragedy I speak of, are now a fine young man and woman, the son recently married and the daughter about to be, but both Johor and his wife still carry on their bodies the marks of the affray of which I speak. It took place some 20 odd years ago, and Johor, his wife and two young children were at that time living at Kuala Seran, *i. e.*, where the Telom and Seran, as I before explained, divide, and go in separate directions.

It was just after the Perak war, and one day, Johor was sitting in his house preparing a quid of betel, his wife plaiting a mat, and his two children sitting on the floor playing. Simultaneously two men appeared armed with spear and kris, one at the front and one at the back door. The one at the back door remained on the ground, while the one in front, mounted the three or four ladder-like steps into the house and made a vicious stab at Johor with his spear, which he in the act of rising managed to ward off. Failing in this the stranger reversed the spear, and dealt him a smashing blow across the head, with the heavy petaling wood handle. Half blinded by the blood which poured down over his face Johor seized the spear, and a desperate struggle ensued. Finding he could not wrench it away, the stranger drew his kris and tried to stab him, but he warded off the stabs as best he could with his arms, at the same time with his feet pushing the children away out of danger.

His wife attempting to assist him, seized the blade of the kris, and she showed me the two fingers, minus the tops, where it was dragged through her hands. Johor has the mark where his scalp was laid open by the blow from the spear, while his arms are scored with the marks of the cuts he received in warding off the stabs. Suddenly he bethought him of the Tumbuh Lada (small dagger) in his belt, and drawing it he thrust it into the bowels of his assailant, who fell dying. All this though it takes some time to write, took place very quickly, and the man at the back door, who had been simply gazing at the struggle, on seeing his friend fall, rushed in. Johor seized his gun, which was standing loaded against the wall, but before he could get it up to fire, the stranger seized the muzzle, and a fierce struggle ensued for the possession of it. With a quick snatch however, Johor succeeded in dragging it from him, and shot him through the stomach, and killed him also. "Allah Tuan," said Johor, "Habis t'lahi rumah saya, macham orang potong kribau".

Asking him why this attack was made on him, he explained that these men were relatives of one of the Perak Rajahs, who had taken an active part in the war there, and were fleeing from the wrath to come, to Kelantan. They had crossed over from Perak, and made their way down the Telom, and being hard up, and hearing that Johor owned a couple of guns, they made up their minds to kill him, steal his guns and boat, and take his wife and children to sell for slaves in Kelantan. The next day, coming down to Kuala Medang, I was shown the place when the house originally stood, in which this affair took place.

*W. Bertrand Roberts.*

**Birds collected and observed on the Larut Hills,  
Perak, in March and April 1898.**

It was with the greatest pleasure that I found myself able to devote the months of February and March this year (1898) to forming a collection of birds on the Larut Hills in Perak. I believe that Mr. L. Wray, Jr., and Dr. Hartert for a few days in 1888, are the only other ornithologists who have collected on these mountains. Mr. Wray was fortunate in being the first man on the ground, and he made the most of his opportunities, obtaining, apparently, all the then new species which are at all common on the hills, and several which must be distinctly rare, as I failed to procure a single specimen of some of them in two months energetic collecting. The ornithological results of Mr. Wray's very successful collecting expeditions in the mountains were described by Dr. R. Bowdler Sharpe in two papers in the P. Z. S. for 1887 and 1888, which have been reprinted in the Journal of this Society (No. 19, p. 125., and No. 21, p. 1.)

These two papers deal with collections made on the Larut Hills and on the Batang Padang Mountains. For practical purposes they may both be taken as dealing with the birds of the Larut Hills, the avifauna of the higher mountains, as far as is yet known, not differing appreciably from that of the lower range. In fact, all the novelties yet obtained in the mountains of the Malay Peninsula occur at 3,000 to 5,000 feet altitude. As yet no single species has been discovered with a habitat restricted to the higher elevations of 6,000 or 7,000 feet, though it is quite possible that some such forms may exist.

Ninety-five species are enumerated in these two papers, which do not include birds not actually obtained. My list is longer, containing 113 species, as I have included all birds seen and identified as well as those shot. Mr. Wray's lists contain a number of species which I did not come across, while mine contains several which are not to be found in Mr. Wray's. The obvious inference to be drawn from this is that there are pro-

bably yet a number of species on the hills which neither of us met with and that our united lists are by no means complete. Some more novelties are sure to be obtained in time on these mountains; the small and inconspicuous species especially are likely to repay attention.

I am much indebted to Mr. J. P. Rodger, British Resident, Selangor, for assistance kindly afforded me while he was acting as Resident of Perak. In giving me permission to collect for scientific purposes Mr. Rodger requested me to restrict myself to four specimens of a species. It will be seen that on the whole I contented myself with considerably less.

I have also to thank Mr. L. Wray, Jr. for much information about the birds of the hills, and for the kindness with which he was always ready to go over his own collections with me when I was in Taipeng.

I hope shortly to publish elsewhere a more complete paper on the birds at present known to occur on the mountains of the Peninsula; in the mean time, I give a list of the species I met with during my two months on Maxwell's Hill. The brief notes as to elevation, etc., after each species must not be taken as hard and fast rules, but only as my individual experience of the bird's habitat, given for comparison with the notes of other observers. In this list I have arranged the species according to the classification in Messrs. Oates' and Blanford's "Bird" volumes in the Fauna of India Series, inserting those species not in the Indian list in what seemed to me their proper places. I have not, as is usually done, inserted the names of Families and Sub-families in large print between each few species, as in most cases it seems to me unnecessary waste of space.

The identifications in this list are, I believe, absolutely reliable. A numeral in brackets following the note on a species denotes the number of specimens I obtained. In all cases where such a number follows, the birds have been worked out by no less an authority than Dr. Ernst Hartert, of Tring Museum. The remaining species are identified by myself, but they are all birds with which I was previously, or have since become, familiar, and I am confident of the correctness of the names given. In some cases where species have been split up into recognized

sub-species the trinomials are there used for the sake of accuracy.

Three species new to science are included in this list, and their descriptions quoted; other birds are recorded from the mountains of the Peninsula for the first time.

Glancing through the list one is struck by the fact that over ninety genera are represented by the 113 species given.

The whole of the birds that I obtained are now in the Hon'ble. Walter Rothschild's magnificent collection at Tring.

1. *Rhinocichla mitrata* (S.<sup>c</sup>Müll).

Very common above 3500 feet, feeding in noisy parties. (3)

2. *Trochalopteron peninsulae*. Sharpe.

Wray's Laughing Thrush. Only one obtained between The Hut and The Cottage, 4000 feet. (1)

3. *Pomatorhinus wrayi*. Sharpe.

Wray's Scimitar Babbler. Common at about 4000 feet generally in parties, which like others of the genus keep up a loud liquid call note. A very skulking bird, and not easy to procure. I failed to find the only one I shot.

4. *Gampsorhynchus saturation*. Sharpe.

The Perak Ring-necked Shrike-babbler. Sharpe described this species from a specimen obtained by Mr. L. Wray on Gunong Batu Puteh, but Mr. Blanford does not consider it entitled to specific distinction (Fauna of India, Birds, I. p. 137). Hence I was particularly anxious to obtain specimens for comparison; but though I saw what must have been this bird once at 3500 feet, I failed to shoot it.

5. *Corythocichla leucosticta*. Sharpe.

Wray's Spotted Babbler. Not uncommon above 3000 feet; met with in small foraging parties hopping about on or near the ground among rocks and undergrowth. (3)

6. *Turdinus abbotti olivaceus*. (Strickl.)

Abbott's Babbler. Not uncommon in thickets near the foot of the hills. Dr. Sharpe identified a *Turdinus* sent by Mr. Wray from these hills as *sepiarius*. Mine was certainly the same as the bird Mr. Wray has marked *sepiarius*, but Dr. Hartert assures me it is the pale sub-species (*olivaceus*) of *Turdinus abbotti*. (1)

7. *Alcippe peracensis*. Sharpe.

Wray's Black-browed Babbler. Very common at 3000 feet and upwards. (3)

8. *Alcippe cinerea*. (Blyth.)

Grey-headed Babbler. Equally common below 3000 feet. (3)

9. *Stachyris davisoni*. (Sharpe.)

Davison's Babbler. One shot at 2000 feet. (1)

10. *Stachyris poliocephala*. (Temm.)

One shot near the foot of the hills. A pair noticed collecting nest material in April. (1)

11. *Stachyridopsis chrysaea*.

Dr. Hartert says, "A sub-species, duller than Himalayan specimens. Either *St. chrysaea assimilis* or *bocagei*."

Fairly common above 3500 feet, feeding in little flocks which flutter about the undergrowth at the edge of a path quite regardless of being observed. So tame is it that I thought I should never get *far enough away* from one to shoot it, and did rather damage the one I shot; the other I actually knocked down with the barrel of the gun. I contented myself with a pair. (2)

12. *Micornis gularis*. (Raffles.)

The Sumatran Yellow-breasted Babbler. I shot one at 2000 feet, but it was too damaged to preserve.

13. *Myiophoneus eugenii*. (Hume.)

The Burmese Whistling Thrush. Rather rare. I met with

it twice, on rocky streams in the ravines, but failed to get a specimen.

14. *Larvivora cyanea*. (Pall.)

Siberian Blue Chat. I saw this species once only—in April. It was hopping about the undergrowth too close to shoot, and as I backed away it disappeared into the jungle. Recently I came on this species again, on the summit of Bukit Kutu in Selangor, and at once recognized it as the bird I failed to get on the Perak hills. This time I succeeded in shooting it. This is one of the neatest looking little birds I know, the dark blue of the upper plumage contrasting admirably with the delicate white of the breast. 4500 feet.

15. *Brachypteryx nipalensis*. (Hodgs.)

Hodgson's Short-wing. I came on a *Brachypteryx* of sorts once at 4,000 feet. It showed a good deal of curiosity, fluttering nearer as I retreated and keeping too close to shoot. Not caring to blow it to pieces I left it alone. It was probably the above species, which Mr. Wray obtained on these hills.

16. *Sibia similima*. (Salvad.)

The Malay Sibia. Very common above 3,500 feet, below which I never once saw it.

Feeds in parties, running along the branches, etc. with great rapidity and keeping up an incessant "kree-kree-kree." While I was picking up a wounded one which I shot, the rest of the flock fluttered round me and abused me lustily—which perhaps I deserved. (3)

17. *Siva sordidior*. (Sharpe.)

The Malay Dull Siva. Met with in small parties searching for insects among the foliage of trees, and not descending into the undergrowth. I only met with it at about 4,000 feet. (4)

18. *Herpornis xantholeuca*. (Hodgs.)

The White-bellied Herpornis. Goes in good sized flocks, which search the branches of trees for insect food. It often



clings to the outside twigs of a bough in all sorts of tit-like attitudes. Not uncommon. (1)

19. *Pteruthius aeralatus*. (Tick.)

Tickell's Shrike-tit. I met with this handsome little bird several times at about 4,000 feet, always in pairs and quietly searching the branches of tall trees for insects. (2)

20. *Chloropsis icterocephala*.

The Malayan Green Bulbul. Met with up to 3,000 feet, one of the most handsome of the genus. (1)

21. *Irena cyanea*. (Begbie).

The Malayan Fairy Blue-bird. This lovely species is tolerably numerous on the hills up to 3,000 feet. (1)

22. *Melanochlora sultanea*. (Hodgs.)

The Sultan Tit. Common. Mr. Wray notes having seen it as high as 4,500 feet. (4)

23. *Mesia argenteauris*. (Hodgs.)

The Silver-eared Mesia. Not uncommon at 3,500-4,500 feet. (2)

24. *Criniger gutturalis*. (Bonap.)

The Malayan white throated Bulbul. Met with from 2,000 to 3,500 feet in pairs or parties. (2)

25. *Tricholestes criniger*. (Blyth.)

The Hairy-backed Bulbul. Fairly common up to 3,000 feet. (2)

26. *Hemixus cinereus*. (Blyth.)

White-throated Grey Bulbul. Common from 2,000 to 4,000 feet, but not so numerous as on Bukit Kutu where it is extremely plentiful. (2)

27. *Otocompsa flaviventris*. (Tick.)

Black-crested Yellow Bulbul. Not uncommon at 2,000 feet

or so, but far from numerous. (1)

28. *Iole tickelli peracensis*. (Hartert and Butler.)

A sub species of *I. tickelli tickelli*, differing in the darker and less rufous brown crown, more dingy grey ear coverts, and more ashy breast and flanks. Common from 3,500 feet upwards. (3)

29. *Iole olivacea*. (Blyth.)

The Malay Olive Bulbul. Common up to 2,000 feet. (3)

30. *Pycnonotus finlaysoni*. (Strickl.)

Finlayson's Stripe-throated Bulbul. Two or three pairs of this Bulbul used to frequent the bushes in the bottom of the ravine in front of the Tea Garden Bungalow, 2,000 feet. (1)

31. *Pycnonotus cyaniventris*. (Blyth.)

The Blue-bellied Bulbul. Not very plentiful. Obtained at 2,000 feet. (1)

32. *Pycnonotus salvadorii*. (Sharpe.)

The Small Olive Bulbul. Shot at 2,000 feet. The orange yellow eyelid and base of bill so conspicuous in freshly shot birds fades almost at once in skins. (1)

33. *Pycnonotus simplex*. (Less.)

Moore's Olive Bulbul. Common up to 2,000 feet. (3)

34. *Dendrophila azurea*. (Less.)

The Azure Nuthatch. Met with occasionally in small parties working about on the trunks of large trees. Sharpe remarks of a single specimen sent him by Mr. Wray that it was duller blue on the back than Javan examples. I particularly wanted specimens for comparison, but was unlucky in losing two out of the three I shot. The one I did get however quite bore out Sharpe's remarks, and the bird is probably entitled to sub-specific distinction. (1)

35. *Bhringa remifer*. (Temm.)

The Lesser Racket-tailed Drongo. Common at a high

elevation. I did not notice it below 3,000 feet. (I)

36. *Orthotomus atrigularis*. (Temm.)

Black-necked Tailor Bird. A few small tailor-birds which frequented the clearing round the Tea Garden bungalow were, I think, of this species. I somehow omitted to shoot a specimen.

37. *Cisticola beavani*. (Wald.)

Numerous in the Tea Garden clearing, frequenting the weeds and bushes near the jungle edge. Dr. Hartert tells me that they are paler and less rufescent than any of the Indian specimens with which they have been compared. I regret that I did not shoot a few more. (2)

38. *Cryptolopha butleri*. (Hartert.)

Butler's Flycatcher Warbler. A new species. For the benefit of local readers I quote the description from the Bulletin of the British Ornithologist's Club, No. LIV, p. 50. Adult male, Crown of the head dark rufous with a broad deep brown lateral stripe; sides of the head and back ashy grey; lower back, rump, scapulars, smaller upper wing-coverts, edges to the primaries and retrices yellowish green; larger upper wing-coverts blackish, with a greenish wash and greenish yellow tips; throat and fore-neck to the chest pale grey; middle of the abdomen white; sides of body, under wing-coverts, axillaries, vent, and under tail-coverts lemon-yellow. Iris reddish brown; bill dusky, mandible yellowish fleshy; feet brownish yellow.

Wing 51-54 m m., tail 42-45, bill 6. 5-7, tarsus 16-16.5. Nearest to *C. castaneiceps*, but easily distinguished by its darker crown and grey back besides other differences. I found this little bird not uncommon at 4,000 feet and saw it as low as 3,000 feet. I found 3 nests during April; they were very like nests of the common European Wren, placed under overhanging banks, two containing three young each and the other a clutch of 3 fresh eggs, of the usual *Cryptolopha* type—pure white. (2).

39. *Phyllergates cucullatus*. (Temm.)

Golden-headed Warbler. Not uncommon above 4,000 feet,

frequenting the sides of the path, the garden round The Cottage, etc. Exactly like a Tailor-bird in appearance and habits, though differing in several important generic characteristics. The discovery of its nest would be of great interest. Oates suggests that this genus may nest in holes of trees, like *Abornis*. The bird seemed to me so very tailor-bird-like in its habits that I should hardly expect it myself to differ very much in nidification. (2).

40. *Sutoria maculicauda*. (Moore.)

2,000 to 3,000 feet. Not common. I found a nest, a typical tailor-bird's, sewn between two leaves, and containing one egg of the Tailor-bird type. I cannot give a description, as on my revisiting the nest next day I found it empty. This was in April. (1.)

41. *Lanius tigrinus*. (Drap.)

The Thick-billed shrike. Met with half-a-dozen times up to 3,500 feet, mostly immature specimens. 1

42. *Tephrodornis gularis*. (Raffles.)

Malay Wood Shrike. Only shot it once at 3,000 feet, but probably overlooked it on other occasions, owing to the difficulty of identifying birds feeding high overhead in lofty trees. (1)

43. *Pericrocotus wrayi*. (Sharpe.)

Wray's Minivet. Replaces the next species at about 3,500 feet, above which it is fairly common. 2

44. *Pericrocotus speciosus fraterculus*. (Swinhoe.)

The Burmese Scarlet Minivet. Obtained from 1,500 feet to 3,000 or 3,500, where it gives place to the last form. 2

45. *Pericrocotus flammifer*. (Hume.)

Davidson's Scarlet Minivet. I shot a male at just over two thousand feet; it was very badly shot and I did not preserve it, expecting to get others.

46. *Pericrocotus igneus*. (Blyth.)

The Fiery Minivet. I shot a female Minivet at 4,000 feet

with a red rump. It was unfortunately too damaged for preservation. I think it must have been *igneus*. Sharpe's *Pericrocotus croceus* I looked for in vain.

47. *Graucalus larutensis*. (Sharpe.)

The Larut Cuckoo Shrike. Not uncommon above the Maxwell's bungalow clearing, but I only shot one, fortunately a female, which has not been described previously, Sharpe having only seen the male (1)

48. *Hemichelidon sibiricus*. (Gm.)

Sooty Flycatcher. A very common winter visitor. A few were still about at the beginning of April. (2)

49. *Hemichelidon ferrugineus*. (Hodgs.)

Ferruginous Flycatcher. Not uncommon between 1,500 and 3,500 feet. I did not notice it higher. (1).

50. *Cyornis tickelli*. (Blyth.)

Tickell's Blue Flycatcher. I saw this species once at 4,000 feet. I have since obtained it at 3,000 feet on Bukit Kutu. Malayan specimens are smaller than Indian ones.

51. *Nitidula hodgsoni*. (Moore.)

The Pigmy Blue Flycatcher. I obtained one at 4,500 feet. Oates says he cannot find a single note on its habits. This specimen was moving about in a big bunch of a parasitic plant growing upon a thick bough; once or twice it fluttered out and captured a small insect in true flycatcher style, and once I saw it hover for a second or two something like a Honeysucker. I believe this is the first time it has been obtained in this locality. Oates gives its distribution as Sikkim, Assam and the Naga hills. (1.)

52. *Muscicapula westermanni*. (Sharpe.)

The Malay Little Pied Flycatcher. Not uncommon at 4,000 feet. (1)

53. *Digenea malayana*. Sharpe.

The Malay White Gorgeted Flycatcher. I obtained two

specimens at 4,000 feet. While engaged in setting a steel trap baited with grains of rice, meant for any small mammal which might get caught, I saw two of these little flycatchers hopping about the ground and the low undergrowth, and uttering a sharp little squeak. I shot one and the other flew off. Two hours later, however, I found it in the trap I had just set, doubtless attracted by the freshly turned earth and dead leaves I had sprinkled over the plate. I did not meet with the species again. Very close to *D. submoniliger*. (2.)

54. *Alseonax latirostris*. (Raffles.)

The Brown Flycatcher. Winter visitor; fairly common. (1.)

55. *Culicicapa ceylonensis*. (Swainson.)

Grey-headed Flycatcher. Common above 2,000 feet.

56. *Niltava grandis*. (Hodgs.)

The Large Niltava. Not uncommon below the Cottage, at about 4,000 feet. Has a good song. Smaller than Indian examples. (2.)

57. *Terpsiphone affinis*. (Hay.)

The Burmese Paradise Flycatcher. I saw adult white males two or three times between 2,000 and 3,000 feet, but failed to get a specimen.

58. *Rhipidura albicollis*. (Vieill.)

White-throated Fantail Flycatcher. Almost always among the parties of birds which one comes upon at about 4,000 feet. White tips to retrices broader than in Indian examples. Bornean ones again are like Indian. (1.)

59. *Henicurus schistaceus*. (Hodgs.)

The Slaty Forktail. A snap shot in the dusk at an unfamiliar Forktail darting up a stream luckily resulted in a specimen of this species. This was at 2,000 feet, and the only time I met with it. New to the Larut Hill list. 1

60. *Hydrocichla ruficapilla*. (Temm.)

The Chestnut-headed Forktail. Occurs up to 4,000 feet,

frequenting the streams which filter through the dark ravines. When these are in spate after a downpour of rain, the Forktails come out on to the roads. As a rule this is a very shy bird, but some individuals are extremely tame. I found a nest in a cleft of a moss-grown rock by the edge of the path. It was composed very largely of earth, thickly covered with green moss and was consequently remarkably heavy for its size. It contained two longish cream white eggs, very glossy, and spotted with rufous. (2.)

61. *Copsychus saularis*. (Linn.)

The Magpie Robin. A few pairs round the Tea Garden and Maxwell's bungalow.

62. *Geocichla innotata*. (Blyth.)

The Malay Ground Thrush. A blue-grey *Geocichla* with an orange breast flew past me once in thick jungle at 2,000 feet; it is almost certain to have been this species.

63. *Monticola gularis*.

I obtained one specimen—an immature male—of this very rare little Thrush in thick jungle at about 2,500 feet. (1.)

64. *Monticola cyanus solitaria*. (P. L. Müll.)

The Eastern Blue Rock Thrush. I noticed a blue Rock Thrush frequenting the rocks, fallen trees, etc., on the Tea Garden clearing; it was very shy and eluded pursuit for some days. When obtained it proved to be this species. Elevation 2,000 feet. (1.)

65. *Uroloncha acuticauda*. (Hodgs.)

Hodgson's Munia. Fairly plentiful about the Tea Garden clearing. They were breeding in April, and I found several of their well known nests.

66. *Hirundo gutturalis*. (Scop.)

The Eastern House Swallow. Numerous round the bungalows on the hill.

67. *Motacilla melanope*. (Pall.)

The Grey Wagtail. Common about roads, streams, clearings, etc., at all elevations. Had not left by middle of April.

68. *Anthus rufulus malayensis*.

The Malay Pipit. Should not perhaps be included in this list. I mention it as there was one specimen in my collection, but it was shot at the foot of the hills and not on them. (1.)

69. *Anthus maculatus*. (Hodgs.)

The Indian Tree Pipit. The only Pipit met with on the hills. A party of a dozen or so frequented the Maxwell's bungalow clearing throughout March and beginning of April. I never saw them settle on a tree when disturbed. Probably their habits are more arboreal in the breeding season than at other times. (1.)

70. *Æthopyga wrayi*. (Sharpe.)

Wray's Honeysucker. These beautiful little birds are common at 3,500 feet and upwards. The Scarlet Hibiscus flowers in the gardens on the hill are a great attraction to them. They visit these principally in the hottest part of the day—for an hour or two after noon. I may mention that I recently obtained the bird again on the summit of Bukit Kutu, Selangor, 3,800 feet. It has, I believe, hitherto only been obtained on the Perak hills. It will probably prove to occur throughout the Peninsula where the mountains rise to over 3,000 feet. Mr. Wray, writing to Dr. Sharpe says, "There is another species of Honeysucker, but I was not able to get a specimen of it." I kept a sharp look out for this, but saw no other species on these hills. Since then, however, I have twice shot, on Bukit Kutu and at Ginting Bedei, a lovely scarlet Honeysucker with brilliant violet moustachial stripes, and a sort of coronet of the same colour, formed by two lines running from the nostrils and encircling the crown. From want of books of reference I have had to send it home for identification, and have not yet heard about it. Possibly this was the other Honeysucker seen by Mr. Wray. (5.)

71. *Arachnothera magna*. (Hodgs.)

Common between 3,500 and 4,000 feet; I saw one or two as



low as 2,000 feet. A very active restless bird, always on the move. Constantly in the jungle something darts past one with a whirr, and only its characteristic sharp squeak enables one to recognize the spider-hunter. (4.)

72. *Dicaeum ignipectus*. (Hodgs.)

Fire-breasted Flowerpecker. I shot one at 4,000 feet. Probably common, but it is impossible to identify these tiny birds with certainty on tall trees. (1.)

73. *Prionochilus ignicapillus*. (Eyt.)

Crimson-breasted Flowerpecker. Fairly common up to 4000 feet. (1.)

74. *Prionochilus maculatus*. (Temm.)

The White throated Flowerpecker. Met with on the higher parts of the hill. (1.)

75. *Serilophus rothschildi*. (Hartert and Butler.)

Rothschild's Broadbill. The discovery of this very beautiful little broadbill—the third known species of its genus—made a red-letter day for a collector. I first came across it at 2,500 feet. Two little greybreasted birds were sitting side by side on a tall tree and, not being able to make them out I fired at them and killed both. The birds fell into a dense tangle of thorny rattan, and at the end of half-an-hour's search I was just giving up in disgust when I found one of them. Seeing at a glance that it was a novelty and a very beautiful one, I renewed my search, cutting away the abominably thorny shoots of the rattan one by one with my hunting knife, and eventually succeeded in finding the other. I subsequently came upon a party of these broadbills at 3,500 feet. They were engaged in quietly searching the foliage of a large-leaved tree for insects, and every now and then uttering a clear little whistle like "pee-u." Once or twice I saw one hover at the extremity of a bough to catch an insect on the outermost leaves, something after the manner of a *Pericocrotus*. On the whole their actions struck me as rather sluggish. I quote the description of this new species from the Bulletin of the British Ornithologists' Club, No. LIV.

p.50. "Differs from *S. lunatus* with which it agrees in the peculiarly shaped tips of the longest primaries, in being darker and greyer above; crown of the head pure grey, not pale rusty brown; ear-coverts grey with hardly a tint of brown, while they are pale brown in *S. lunatus*, and the rufous colour on the secondaries is deeper; round the eye a narrow ring of white feathers. 'Iris greenish brown, mottled with golden specks; eyelid and base of mandible for about  $\frac{1}{8}$  inch, bright gamboge yellow; bill pale whitish blue, tip and lateral edges whitish; feet pale greenish chrome, claws milky blue' (A. L. Butler)" Named in compliment to Mr. Walter Rothschild (3.)

76. *Psarisomus dalhousiae*. (Jameson.)

The Longtailed Broadbill.

Mr. H. Palgrave Turner shot one of these lovely broadbills at 3500 feet, and kindly gave it to me. It is a very perfect specimen and is now in the Selangor Museum. (1.)

77. *Gecinus rodgeri*. Hartert and Butler.

Rodger's Woodpecker.

A new species obtained at 3,500 feet. I am not sure whether the full description has yet appeared in print; it has not yet reached me, and I do not wish to anticipate it. Dr. Hartert, comparing it with *G. chlorolophus* and *G. chlorigaster* says, *in epist.* "Differs from *chlorolophus* in its much darker and more uniform green upperside, shorter wing, and darker abdomen with much narrower cross-bars. Differs from *chlorigaster* in its larger size, longer wing, and in the middle of the crown being green and not red." Named in honour of Mr. J. P. Rodger, British Resident, Selangor. (1.)

78. *Chrysophlegma humii*. (Hargitt.)

The Chequered-throated Woodpecker.

I shot one at 3,500 feet. I have also met with it in the low country. (1.)

79. *Miglyptes grammithorax*. (Malh.)

The Fulvous-rumped Barred Woodpecker.

Less common than *M. tukki* on the hills. I saw it once at 3,000 feet.

80. *Miglyptes tukki*. (Lesson.)

The Buff-necked Barred Woodpecker.

Common from 2000 to 4000 feet; generally in pairs, but sometimes in small parties of 5 or 6. The note is a long trill. (4.)

81. *Chrysocolaptes validus*. (Temm.)

Golden backed Bar-winged Woodpecker.

Chiefly a low country form; I saw one pair at 2000 feet and obtained one specimen. (1.)

82. *Vivia innominata*. (Burton.)

The Speckled Piculet.

This diminutive Woodpecker is apparently scarce, though its small size doubtless causes it to be overlooked. My specimen was shot at 4,000 feet, associating with a large foraging party of various small birds. It was swinging on a trailing liana-like creeper, across which it had perched, and might almost have been mistaken for some sort of Flower-pecker. (1.)

83. *Psilopogon pyrolophus*. (S. Müll.)

The Bar-billed Barbet.

I found this very beautiful barbet from 3,000 to nearly 5000 feet. Mr. Wray says it is a very silent bird, only occasionally uttering a harsh note like that of a Woodpecker. I never heard it utter any note that I can remember, which bears out what Mr. Wray says as to its being usually so silent, but Hartert has described its note very differently. (J. f. O. 1889.) (3.)

84. *Mesobucco duvauceli*. (Lesson.)

The Crimson-eared Barbet. Very common, from the low country up to 4000 feet. This is one of the most annoying birds I know to try and shoot. It ensconces itself among the foliage at the very top of a very high tree, often, in the low country, a durian, and there keeps up for hours together, an in-

cessant "twit-twit, twit-twit!" very like the note of an English nuthatch. Owing to its turning its head from side to side while calling, these monotonous notes seem to come from a different direction every minute, and even when one has succeeded in locating the bird more or less exactly it is impossible to see it owing to its small size, leaf-green colour, and its habit of keeping absolutely motionless (except for turning its head about) as long as it is calling. You may clap your hands, shout and throw stones into the tree as much as you like, but you won't get it to move, much less take wing and give a flying shot. If two of you are shooting together, however, things are simplified considerably. You put the other gun on the far side of the tree and fire three or four shots at hazard into the top of it. Then at last the little barbet elects to move, and the other man gets a very high snap shot at a diminutive bird flying very jerkily away, which he *may* hit, but is much more likely not to!

All four birds I have obtained thus have been males. (2.)

85. *Cyanops oorti*. (S. Mull.)

Common: my specimens were obtained from 2,500 to 4,000 feet. (4.)

86. *Chotorhea chrysopogon*. (Temm.)

Gold Whiskered Barbet. Common: from the foot of the hills to over 3000 feet. (3.)

87. *Calorhamphus hayi*. (Gray.)

The Brown Barbet. Fairly common. Low country and up to 3500 feet; generally in parties; rather sluggish in its movements. (4.)

88. *Merops sumatranus*, *Raffles*.

The Sumatran Bee-eater.

Flocks of this Bee-eater were met with up to 2000 feet (1.)

89. *Nyctiornis amictus*. (Temm.)

The Red-bearded Bee-eater.

Tolerably common, from the low country up to 4500 feet. Blanford and other authorities say "nidification unknown," but I find in No. 24 of this Journal, p. 169, a nest and eggs described by Lieut. H. J. Kelsall, which are doubtless rightly attributed to this species. I have several times found nest-holes in banks in heavy forest which could only have been those of this bird, though I never found one in use to settle the question. The note of this bird is extraordinary, a very hoarse and loud "ka-ka! ka-ka!", which, until I found out the author of it, I thought must come from some sort of hornbill at least! (2)

90. *Dichoceros bicornis*. (Linn.)

The Great Hornbill.

I met with this grand Hornbill several times near the top of the Hill, but it was considerably scarcer than the next species.

91. *Buceros rhinoceros*. (Linn.)

The Rhinoceros Hornbill.

The commonest large Hornbill on the hills, where their extraordinarily loud and discordant notes may be heard throughout the day at intervals. (3.)

92. *Anorrhinus galeritus* (Temm.)

The Bushy-Crested Hornbill.

Not uncommon at 2000 feet and upwards. I have also met with it at Ginting Bedei and Bukit Kutu in Selangor, but not yet at less than 2000 feet elevation. This Hornbill is almost always in small flocks, which keep up a curious shrill call at intervals. It always reminded me forcibly of the chorus raised by a litter of hungry puppies whose mother has tantalized them by paying them a short visit and leaving them again! I found them shy and difficult to shoot, making off by short flights from tree to tree directly they were approached. Their habits seemed to me very regular, a flock visiting a particular tree just at noon for several days, until the fruit supply was exhausted. (2.)

93. *Rhinoplax vigil*. (Forster.)

The Helmeted Hornbill.

This magnificent Hornbill, though constantly heard, seems very shy, and though I saw a pair once or twice I failed to get a specimen. Davison has described its note excellently. He says, "The note is very peculiar and powerful; it begins with a series of whoops, uttered at intervals that grow gradually less till, after ten or a dozen quick repetitions the call ends in a harsh cackling laugh." This account would be hard to improve on. The first notes sound not unlike the distant blow of an axe on timber, and it is doubtless this species that is referred to in the Malay legend of the man who cut down his unfortunate mother-in-law's house and then burst into a peal of laughter, for which he was punished by being turned into a bird. The use of the heavy ivory casque of this hornbill remains to be discovered.

94. *Chætura gigantea*. (Temm.)

The Brown-necked Spine-tail Swift.

Often seen hawking over the hills.

95. *Chætura leucopygialis*. (Blyth.)

The Grey-rumped Spine-tail. Very common up to 3000 feet or so; I forget whether I observed it higher. It has none of the arrow-like speed of the larger Spine-tails. (2.)

96. *Collocalia francica*. (Gmel.)

The Little Grey-rumped Swiftlet.

Common at the higher elevations.

97. *Collocalia linchi*. (Horsf. and M.)

Horsfield's Swiftlet. The same applies. This charming little swift is very fond of building in rooms, etc. A pair did their best to start a nest in the Tea Garden bungalow when I was there. They never succeeded in getting anything to stick to the white paint of the ceiling, but carried on the attempt perseveringly for a long time. In the Andamans, where this species is numerous, I have seen it roosting in buildings, clinging to the walls in clusters like a swarm of bees. On these occasions I have often seen one catch its mate, unable to find room

for a foothold beside it, by the tip of the wingfeathers and hold it hanging thus for several seconds. (2.)

98. *Macropteryx longipennis* (Rafinesque.)

The Malayan Crested Swift. I occasionally noticed it hawking over the tops of the jungle up to nearly 5,000 feet.

99. *Macropteryx comata*. (Blyth.)

The Tufted Tree-Swift. Seen at 2,000 feet, but not as numerous as in the low country.

100. *Caprimulgus indicus jotaka*. (Temm.)

The Jungle Nightjar. A few pairs frequented the Tea Garden clearing (at 2,000 feet) and used to hawk along the jungle edge at dusk. I shot a pair. (2.)

*C. macrurus* and *Lyncornis temminckii*, so common in the low country, I neither saw nor heard on the hills.

101. *Harpactes erythrocephalus*. (Gould.)

The Red-headed Trogon. Met with several times at 3,500 feet or so. (1.)

102. *Harpactes duvauceli*. (Temm.)

The Red-rumped Trogon. I obtained one very young example at 3,500 feet. (1.)

103. *Zanclostomus javanicus*. (Horsf.)

The Lesser Red-billed Malkoha.

Seems to me to range higher up the hills than the other birds of this group. It is not uncommon at 3,500 feet. It is very partial to the big wingless females of one of the larger stick insects, for which it searches the branches so systematically that the insect's wonderful likeness to a dead twig avails it nothing. Having pecked and bruised the mantis into a state of helplessness, the bird proceeds to pull off the strong spiny legs one by one and then swallows the long body head first. I have taken 3 of these insects, 7 or 8 inches long and nearly as thick as one's little finger from the stomach of one of these Malkohas. (1.)

104. *Rhinortha chlorophæa*. (Raffles.)

Raffles' Green-billed Malkoha.

This very common low country bird ranges up the hills to about 2,000 feet, above which I have not seen it.

105. *Ketupa javanensis*. (Less.)

The Malay Fish-Owl.

I disturbed one from a bough overhanging a stream in thick jungle near the foot of the hills.

106. *Spizaetus albiniger*. (Blyth.)

Blyth's Hawk-eagle.

A pair of these very beautiful eagles used to visit the tea garden clearing regularly during my stay there, attracted by a brood of chickens, one or two of which they carried off daily for a week. Coming round the corner of a cattle-shed one day I came upon one of them sitting on a stump not more than ten yards from me. Instead of flying he merely erected his crest and stared at me, and I backed quietly away to 30 yards distance and shot him. (1.)

107. *Spilornis bacha*.

The Malay Snake-eagle.

Frequently seen, but not shot.

108. *Accipiter virgatus* (Reinw.)

The Besra Sparrow-hawk.

Seen once or twice up to 3,000 feet. I found a nest with the bird sitting near the foot of the hills, in April, but the tree was quite unclimbable.

109. *Treron nepalensis*. (Hodgs.)

The Thick-billed Green Pigeon.

Small flocks met with and a few birds shot up to 3,500 feet.

110. *Ducula badia*. (Raffles.)

The Copper-backed Imperial Pigeon.



A few of these fine Pigeons were seen, generally passing over at a great height. I shot one specimen at 3500 feet. (1.)

111. *Chalcophaps indica*. (Linn.)

The Bronze-winged Dove.

Heard and seen up to 3,500 feet.

112. *Macropygia ruficeps*. (Temm.)

The Little Malay Cuckoo-Dove.

Fairly common from 2,000 to 4,000 feet. I shot several specimens, most of which were rather knocked about and were handed over to the cook. Mr. Wray notes Cuckoo-Doves as rare on these hills, and Sharpe wrote of the only specimen that Mr. Wray sent him that it appeared to be *M. tusalia*. Mine were all *M. ruficeps*. (1.)

113. *Argusianus argus*. (Linn.)

The Argus Pheasant.

Heard frequently up to 2,500 feet, but as usual, not seen. (1—trapped.)

This completes the list of species identified during my two months on the Larut Hills. I met with two other birds which I have left out of the above list, not knowing where to insert them. One was a dark grey Thrush-like bird which I obtained a glimpse of only in thick jungle at 3,500 feet, and which may perhaps have been *Melanocichla peninsularis* (Sharpe.) The other was a small robin-like brown bird, with a good deal of white on the bases of the tail-feathers. I found this bird one morning in the same trap which caught one of the specimens of *Digenea malayana* as mentioned above. Elevation 4,000 feet. I accidentally omitted to send it to Tring with the rest of my collections, and though I did so subsequently I have not yet received the identification.

A. L. Butler.

**A Catalogue of the Ferns of Borneo and  
some of the adjacent Islands which have been  
recorded up to the present time.**

—:—

The following list contains, I believe, all the Ferns that have been recorded from Borneo, the Sulu Archipelago, the Natunas, and a few small islands close to the Borneo Coast. It is probably very far from being a complete catalogue of all the members of this interesting family that exist in that region. The Ferns belonging to Borneo itself have been collected almost exclusively in the State of Sarawak, and the Territory of British North Borneo. These two countries together occupy about one third part only of the whole island, the remainder (with the exception of the small kingdom still held by the Sultan of Brunei) being in the possession of the Dutch Government. It is possible that in Dutch scientific publications a few species not mentioned here may have been recorded, but, if so, they have not come to my knowledge.

The large number of new species which have been found in recent years within a comparatively small area, chiefly by Signor Beccari, Mr. Burbidge, Mr. Charles Hose, Dr. G. D. Haviland and myself, leads to the belief that a rich harvest awaits the collector who shall hereafter visit the less known districts of Dutch Borneo. Of the 430 species and varieties contained in this list, 114 were first found in Borneo. Seven of these have since been met with elsewhere; but there remain 107 which have no other habitat at present known. Some of them are exceedingly rare, several having been only once found.

I have not in all cases mentioned the collector's name: but it is to be understood that when no name is given, that of

Mr. Charles Hose is to be supplied for the Ferns that come from the Baram district of Sarawak, including Mt. Mulu, Mt. Dulit, Mt. Lambir, Niah, &c., and my own in all other instances.

I have followed the arrangement in Hooker and Baker's *Synopsis Filicum*, 2nd Edition, 1874. The Roman numerals refer to the Genus, and the Arabic to the Species; and I have indicated the position of new Ferns, as Mr. Baker does, by giving them the number of the species nearest to them with the addition of an asterisk.

It is much to be desired that the surviving author of the *Synopsis* may find it possible to bring out a new edition, as it has been long out of print, and an enormous addition to the number of known Ferns has been made since its publication. The Supplement, "Ferns discovered or described since 1874," and subsequent lists of new discoveries published by Mr. Baker only in part supply this want, as they are hardly more than lists: for descriptions an immense number of publications have to be consulted, and these are seldom accessible to persons who live in the regions where novelties are to be found.

## FILICES.

### SUB-ORDER I. GLEICHENIACEAE.

#### GLEICHENIA. (Gen. ii Syn. Fil. p. 11.)

*Gleichenia circinata*, Sw. (Syn. Fil. ii. 3.) Mt. Kinabalu, Mr. F. W. Burbidge, 5,000-6,000 ft. and Dr. G. D. Haviland, 10,500 ft.

Distribution: From Australia and New Zealand to Malacca and the Philippines.

— var. *borneensis*, Baker in Jour. Bot. 1879, p. 37. Mt. Kinabalu, Mr. F. W. Burbidge.

*G. (Mertensia) longissima* Bl. (Syn. Fil. ii. 7.) = *G. glauca* Hooker, the oldest name. Mt. Dulit and Mt. Matang. Sarawak, not under 2,500 ft. though elsewhere in Malaya it is found at a much lower elevation.

Distribution: China, Japan, Malaya, West Indies.

— variety *arachnoides* Mett. (Syn. Fil. l. c.) = *G. bullata*, Moore. Mt. Kinabalu, 7000 ft. Sir Hugh Low.

*G. (Mert.) sp.* Large, tripinnatifid, stem and rachises covered with broad acuminate brown scales having whitish cartilaginous edges, the crossing of which on the surface produces an appearance that may be called "cobwebby." Pinnae 18 in. long, 4-5 in. wide, oblong-lanceolate. Secondary pinnae 2-2½ in. l. ¼ in. wide, cut down nearly to the rachis into oblong blunt segments, with margins much recurved. Sori covered by the large spreading scales.

A single specimen in the Sarawak Museum contributed by Dr. G. D. Haviland from Mt. Kinabalu, 8,000 ft. His number 1950. If this is the *G. arachnoides* Hk. from this

locality, marked var. B of *G. longissima* Bl. in. Syn. Fil., it deserved a fuller description than the brief one "broad cobwebby." I think it is a distinct species.

*G. (Mert.) flagellaris*, Spr. (Syn. Fil. ii. 19). Common in the low country and up to 2,000 ft.  
Distribution: Madagascar: Bourbon: throughout Malaya: Fiji.

*G. (Mert.) vestita* Bl. (Syn. Fil. ii. 21.) Mt Dulit, Mt. Matang and Mt. Santubong, Sarawak, 2,500 ft. "Seems conspecific with *G. hirta* Bl." Baker Jour. Linn Soc., Vol. xxii. p. 222. Distribution: Malay Islands.

— var. *paleacea*, Baker in Jour. Bot. 1879. p. 38. N. Borneo by Mr. F. C. Burbidge. Habitat not specified particularly.

*G. (Mertensia) dichotoma* Willd. (Syn. Fil. ii. 23). Very common everywhere. *G. linearis*, Clarke, is said to be the oldest name.  
Distribution: Tropical and subtropical regions of the old and new world and as far north as Japan.

— var. *major*, Moore. Ind. Fil. 376. Sr. Beccari (vide his Borneo Ferns by Cesati), at Marup on the Batang Lupar River, Sarawak.

— var. *divaricata* Moore = *pteridifolia* Presl. Beccari, Malesia vol. iii. p. 17. Same habitat as the preceding variety.

## SUB-ORDER II. POLYPODIACEAE.

### TRIBE I. CYATHEACEAE.

#### . CYATHEA. (Gen. iv. Syn. Fil. p. 15.)

*C. Brunonis*, Wall. (Syn. Fil. iv. 2.) Common in Sarawak at a slight elevation. Caudex a foot or more in height.  
Distribution: Throughout Malaya.

- C. Havilandi*, Baker in Trans. Linn Soc. iv. p. 249. (37\*). Mt. Kinabalu 10,500 ft. Dr. G. D. Haviland.
- C. suluensis*, Baker in Jour. Bot. 1879 p. 5. (38\*). Sulu Archipelago, Mr. F. C. Burbidge.
- C. dulitensis*, Baker in Kew Bulletin, No. 110, Feb., 1896, p. 40. (38\*). Mt. Dulit Sarawak 4,000 ft.
- C. polypoda*, Baker in Trans Linn. Soc. iv. p. 250. (38\*). Mt. Kinabalu 7,000 ft. Dr. G. D. Haviland.
- C. sarawakensis*. Hook. (Syn. Fil. iv, 39) = *C. Lobbiana* Hook. (Syn. Fil. iv. 41) = *Alsophila alternans* Hook. (Syn. Fil. vi. 48). See Baker's *Ferns discovered or described since 1874*. Mt. Matang near the foot.  
Distribution: Malay Peninsula and Islands.
- C. assimilis*, Hooker. (Syn. Fil. iv. 40). Mt. Matang 2,000 ft. and Mt. Dulit, Sarawak.  
Distribution: Celebes.
- C. beccariana*, Cesati, in Fil. Becc. Born. p. 3, found by Beccari in Sarawak. Baker says "belongs to *C. assimilis*," *Ferns discovered or described since 1874*.

ALSOPHILA. (Gen. vi. Syn. Fil. p. 31.)

- A. comosa*, Hk. (Syn. Fil. vi. 50). The Baram district, and Santubong, Sarawak.  
Distribution: Malayan Peninsula and Islands.
- A. contaminans* Wall. (Syn. Fil. vi. 51). Mt. Matang and elsewhere; common. The tallest and most graceful of the Malayan Tree Ferns.  
Distribution: Malayan Peninsula and Islands.
- A. ramispina*, Hooker. (Syn. Fil. vi. 55.) Caudex to 8 ft. Mt. Matang 3,000 ft. and Mt. Dulit in the Baram Residency, Sarawak.

*A. glabra*, Hk. (Syn. Fil. vi. 58.) Mr. F. C. Burbidge, recorded by Baker in Jour. Bot. 1879, p. 38, but with a (?). Habitat not specified.

Distribution: Malay Peninsula and Islands. China and throughout India.

*A. vexans*, Cesati in Fil. Becc. Born. p. 4. Found by Beccari, Sarawak, 1865. Baker says he cannot separate it from *A. glabra* Hooker.

*A. dubia*, Beddome in Jour. Bot. 1888, p. 1. Tab. 279<sup>a</sup> Baker in *Ferns discovered since 1874* says it has been found in Borneo, but does not give habitat or collector's name. I have in my collection a single pinna of a fern collected in the Natuna Islands by Mr. A. H. Everett which is like *A. dubia*, but the specimen is too incomplete for positive identification.

*A. latebrosa*, Hooker (Syn. Fil. vi. 59.) Common in Sarawak up to 2,000 ft.

Distribution: Almost throughout India proper, Malaya, Formosa, etc.

*A. Wallacei*, Mett. (Syn. Fil. p. 450.) Habitat "Borneo, (Wallace.)" I know nothing of this Fern beyond the notice of it in the Synopsis Filicum referred to.

*A. Burbidgei*, Baker in Jour. Bot. 1879. p. 38. To the description there this addition should be made; Stipes 2 ft. or more long, having a dense fringe of brown lanceolate scales,  $\frac{1}{2}$  in. long by 1 l. broad, along the under surface, extending to beyond the lowest pinnæ; the upper surface armed with minute prickles. Mt. Matang Sarawak, 500 to 800 ft. and the Baram River. Mr. Burbidge's specimens came from North Borneo.

#### MATONIA (Gen. viii. Syn. Fil.)

*M. pectinata*, Br. (Syn. Fil. viii. 1.) Mt. Matang and Mt. Santubong, Sarawak, 2,500 to 3,000 ft. It has lately been found at a low elevation on the Carimon Islands near

Singapore by the Hon. E. E. Isemonger.

Distribution: Malay Peninsula and adjacent Islands.

*M. sarmentosa*, Baker in Jour. Linn. Soc. xxiv. 256, Plate xiv. and in *Ferns discovered since 1874*. Found by Mr. Charles Hose hanging from the roof of a limestone cave at Niah in the Baram Residency, Sarawak. The specific name is unfortunate as it is not sarmentose. Baker describes it in his *Ferns discovered or described since 1874* as "the most interesting novelty that has been found in the period under review."

## TRIBE II. DICKSONIEÆ.

DICKSONIA. (Gen. xiii. Syn. Fil. p. 49.)

*D. (Cibotium) Barometz.* Link. (Syn. Fil. xiii. 2.) Mt. Dulit, Sarawak.

Distribution: Malayan Peninsula and Islands; Assam and S. China.

*D. sorbifolia*, Sm. (Syn. Fil. xiii. 16.) Miri in the Baram Residency, Sarawak. " = *D. papuana*, T. M." Baker.

Distribution: Moluccas and Island of Henimoe; Hindostan.

*D. (Patania) ampla*, Baker in Jour. Linn. Soc. xxii. p. 223. Near Sena on the Serin River, Sarawak, 1884. Found also in Perak, Malay Peninsula.

*D. (Patania) gomphophylla*, Baker in Jour. Linn. Soc. xxii. p. 223. Mt. Matang, Sarawak, 1884. 2,000 ft.

LECANOPTERIS (Gen. xiv.\* Baker Jour. Bot. 1881, p. 366.)

*L. carnos*a, Bl. = *Polypodium tomarioides* Kunze in Syn. Fil. Mt. Matang and Mt. Dulit, Sarawak.

Distribution: Malaya; Philippines; Formosa.

*L. deparioides*, Baker = *Davallia deparioides*, Ces. in Fil. Becc. Born. Sarawak by Beccari; Kuching, Sarawak, growing on a Ficus at Bishop's House.



## TRIBE III. HYMENOPHYLLEÆ

## HYMENOPHYLLUM. (Gen. xvi. Syn. Fil.)

- H. blumeanum*, Sp. 2. See under *H. polyanthos* Sw. (Syn. Fil. xvi. 18.) Mt. Gading, Lundu, Sarawak, 2,000 ft.
- H. javanicum*, Spreng. (Syn. Fil. xvi, 21). Sarawak, growing on trees overhanging rivers Found by Beccari on Gunong Poi.  
Distribution: throughout India and Malaya; the Philippines, N. Zealand, Australia.
- H. australe*, Willd, "a variety of *H. javanicum*, Baker M. S. Natuna Islands; Mr. A. H. Everett, 1892.
- H. dilatatum*, Sw. (Syn. Fil. xvi, 27.) Mt. Matang, Sarawak. 2000 ft. 1884.  
Distribution: Java, N. Zealand, and Polynesian Islands.
- H. formosum*, Brack, Recorded under this name as found by Mr. Burbidge in North Borneo and in Sulu by Baker in Jour. Bot. 1879, p. 38 and 65. Given in Syn. Fil. as a synonym of *H. dilatatum* Sw.
- H. borneense*, Hk. M. S. S. (Syn. Fil. xvi. 31.) Found by Thomas Lobb, when collecting for the Messrs. Veitch, probably about 1845, on hills near Sarawak at 2,700 ft. See Cesati Fil. Becc. Born. p. 5.
- H. pachydermicum*, Cesati in Fil. Becc. Born. p. 7. Found by Beccari on Gunong Poi. Sarawak in 1866, Near. "*H. ciliatum*." Baker, in *Ferns discovered or described since 1874*, therefore to be numbered (34\*).
- H. obtusum*, Hooker, and Arn. (Syn. Fil. xvi, 35.) North Borneo, Mr. F. C. Burbidge. See Baker in Jour. Bot. 1879, p. 38.  
Distribution: N. Guinea (*Beccari*) East Africa, Oahu, Sandwich Islands.

*H. subflabellatum*, Cesati in Fil. Becc. Born. p. 8. and see Baker *Ferns discovered or described since 1874*, who gives as the position it should have in Syn. Fil. the number (52\*). Beccari, Undup River, Batang Lupar, Sarawak 1865.

*H. Smithii*, Hk. (Syn. Fil. xvi. 63.) North Borneo. Mr. F. C. Burbidge, Jour. Bot. 1879, p. 38. Natuna Islands, Mr. A. H. Everett.

Distribution : Malay Peninsula, Java, Celebes, Philippines.

*H. denticulatum*, Sw. (Syn. Fil. xvi. 69). Found by Mr. A. H. Everett in the Natuna Islands, 1892.

Distribution : Khasi Hills, Moulmein, Java.

*H. brachyglossum*, A. Braun : vide Cesati in Fil. Bec. Born. p. 7. Santubong, by Beccari in 1866.

*H. Neessii*, Hook. (Syn. Fil. xvi. 70). On rocks and trees. Mt. Matang, Gunong Poi, Dulit, etc. and North Borneo.

Distribution : Malaya, Ceylon, Philippines, Fiji.

— var. *H. aculeatum minus* Cesati Fil. Becc. Born. p. 8. Beccari, on Mt. Matang, Sarawak, 1866.

*H. sabinaefolium*. Baker (Syn. Fil. xvi. 71). North Borneo by Mr. F. C. Burbidge. Baker in Jour. Bot. 1879. p. 38.

Distribution : Java.

#### TRICHOMANES (Gen xvii. Syn. Fil.)

*T. Motleyi* v. d. Bosch. (Syn. Fil. xvii. 10). Mt. Matang, by Beccari in 1866.

Distribution : Ceylon, Moulmein, Andamans, New Caledonia.

*T. beccarianum* Ces. Fil. Becc. Born. p. 8. tab. 1. fig. 2. Beccari same locality. Baker says that he cannot separate this or *T. cognatum* Ces. Fil. Becc. Polyn. p. 5. from *T. Motleyi*, Ferns discovered or described since 1874.

*T. vortitum* Baker. N. Sp. Sent to Kew in 1893 and so named by Mr. Baker who said it was to be described in the Kew

Bulletin, but I have not yet seen the description, Jan. 1899. Gunong Gading, Lundu, Sarawak, 1892.

*T. muscoides*, Sw. (Syn. Fil. xvii, 20). Mt. Gading, Lundu, 1,200 ft. Found also by Mr. A. H. Everett in the Natuna Islands.

Distribution: Tropical America, Asia, Polynesia and Africa.

*T. sublimbatum* C. Mull. (Syn. Fil. under *T. muscoides*) Beccari on Mt. Matang, "on moist rocks."

*T. saxifragoides*, Presl. (Syn. Fil. xxii. 22). On most of the hills near Sarawak. This is the *T. minutum* Bl. of Ces. Fil. Becc. Born. pp. 8 and 11.

Distribution: Java, New Ireland, Fiji, and Philippines.

*T. proliferum*, Bl. (Syn. Fil. xvii. 24). Gunong Gading, Lundu, Sarawak at 2,000 ft. 1892.

Distribution: Java, Philippines, Ceylon, and western slope of the Neilgherries.

*T. digitatum*, Swartz (Syn. Fil. xvii. 24). Mt. Matang, Sarawak; and by Beccari on Gunong Poi. In N. Borneo Mr. F. C. Burbidge collected "two different forms, one lengthened out with remote branches, the other short, with close branches." See Baker in Jour. Bot. 1879, p. 38. Distribution: Malaya, Polynesia, Mascarenes.

*T. (Craspedoneuron) ignobile*, Cesati in Fil. Becc. Born. p. 9, (41\*). Beccari Sarawak 1865. "Midway between *T. bicornis* and *T. intramarginale*." Baker in *Ferns discovered or described since 1874*.

*T. endlicherianum* V. D. B. (Baker M. S.) (Syn. Fil. under *T. humile* Forst., xvii. 44). Mt. Matang, Sarawak. 1892.

*T. pallidum*. Blume. (Syn. Fil. xvii. 40). Sarawak, in the Batang Lupar and Undup Rivers by Beccari. In North Borneo by Mr. Burbidge.

Distribution: Ceylon, Malaya, Queensland, Samoa.

- T. serratum*, Baker (Syn. Fil. xvii. 47) "On Labong Perak Borneo"—Found only once apparently; but by whom, and when?
- T. Filicula*, Born. (Syn. Fil. xvii. 48). Common in Sarawak and N. Borneo. Very variable in habit.  
Distribution: widely spread throughout the Tropics of the Old World, and in Polynesia.
- T. pyxidiferum*, L. (Syn. Fil. xvii. 49). This name is given at Kew to three ferns which appear to me absolutely distinct from one another, two of which are from Mt. Matang, and one from the banks of the Sarawak River. In North Borneo Mr. Burbidge found "a handsome variety, with unusually compound rather crisped fronds." Baker in Jour. Bot. 1879 p. 38.  
Distribution: Hindustan as far north as Khasia; Ceylon; Moulmein; New Caledonia; Cape of Good Hope; Bourbon, Fernando Po, Angola, Tropical America.
- T. macrochilon*, Baker (49\*) Trans. of Linn. Soc. iv. p. 250. Mt. Kinabalu 7,000 ft. Haviland.
- T. denticulatum*, Baker (Syn. Fil. xvii. 52). Sarawak and North Borneo. Previously found by Mr. Motley.
- T. javanicum*, Blume. Common.  
Distribution: Tropical Hindustan, Malaya, Polynesian Islands and Madagascar.
- var. *zollingeri*, Cesati. Fil. Becc. Born. p. 10. Beccari, at Banting Sarawak.
- var. *rhomboideum*. (J. Sm). Ces. l.c. Beccari, Banting, Sarawak.
- T. Hosei*, Baker in Jour. Linn. Soc. xxii. 223. tab. 12. Mt. Matang, Sarawak 2,000 ft. 1882.
- T. brevipes*, Baker (Syn. Fil. xvii. 62). Mt. Gading, Lundu, Sarawak by Beccari in 1866.  
Distribution: Singapore, Leyte, Philippines.

*T. rigidum*. Sw. (Syn. Fil. xvii. 70). Mt Matang and Santubong, Sarawak; Mt Kinabalu by Haviland and Mr. Burbidge. In Borneo this fern has the stipes and main rachis fibrillose, and the crown of the tuft often densely so.

Distribution: throughout the tropics in both hemispheres.

*T. apifolium*, Presl. (Syn. Fil. xvii. 71). By Mr. Burbidge and Dr. Haviland in N. Borneo, by Beccari on Mt. Matang, under the name of *T. meifolium*, and by Mr. A. H. Everett in the Natuna Islands.

Distribution: Malaya; Philippines; Polynesia; Norfolk Island.

*T. millefolium*, Presl. Beccari on Mt. Matang.

*T. maximum*, Bl. (Syn. Fil. xvii. 72). Common.

Distribution, Malaya to N. Australia and Polynesia.

*T. hispidulum*, Mett. (Syn. Fil. p. 466.) The Baram district, Sarawak; N. Borneo, Mr. Burbidge;

*T. gemmatum*. J. Sm. (Syn. Fil. xvii. 76.) By Beccari on Gunung Poi 1866.

Distribution: Malayan Peninsula, Venezuela, North of Brazil, Polynesian Islands, Java, Philippines.

*T. ericoides*, Hedw. (Syn. Fil. xvii. 77). Borneo. Where and by whom collected I do not know. It is the *T. longisetum*, Bory. de Saussure in Fil. Becc. Born. p. 10.

Distribution: Java, Samoa, Bourbon.

*T. Pluma*, Hook. (Syn. Fil. xvii. 77\* p. 466). Matang, Santubong, N. Borneo and the Baram Residency, at 3,000 ft. and upwards.

Distribution: Perak, Malay Peninsula.

*T. trycophyllum*, Moore. (Syn. Fil. xvii 77,\* p. 466.) N. Borneo. Burbidge. Low. Haviland. Baker in Jour. Bot. 1879. p. 38, thinks this will prove conspecific with *T. Pluma*.

Distribution: Malaya, New Guinea, New Caledonia.

*T. foeniculaceum* Bory. (Syn. Fil. xvii. 78.) Sandakan, Baiting, Mt. Matang, etc.

Distribution: Mauritius, Bourbon, and Rockingham Bay, Australia.

DAVALLIA. (Gen. xviii. Syn. Fil.)

§ *Humata* Cav.

*D. (Hum) heterophylla*, Sm. (Syn. Fil. xviii, 1). Common in Sarawak.

Distribution: Malaya, and Polynesian Islands.

*D. (Hum) angustata*, Wallich (Syn. Fil. xviii. 2). Santubong and Mt. Matang: not common.

Distribution: Throughout Malaya.

*D. (Hum) parallella*, Wallich (Syn. Fil. xviii 3). At Kuching and on rocks at Gunong Ayer and Santubong, the two mouths of the Sarawak River.

Distribution: Malaya and Polynesian Islands.

*D. (Hum) pinnatifida*, Baker in Jour. Linn. Soc. xxiv. p. 257. (4\*) "Intermediate between *D. pectinata* and *D. pedata*." (Baker) Niah, in the Baram Residency, Sarawak.

*D. (Hum) pedata*, Smith, (Syn. Fil. xviii. 6) Sarawak and N. Borneo. Common on trees and rocks.

Distribution: Khasia, southward to Ceylon, Malaya, Hongkong, Queensland, Mascaren Islands.

*D. (Hum) alpina*, Bl. (Syn. Fil. xviii, 7) Mt. Matang and Mt. Kinabalu, 10,500 ft. Dr. Haviland, 1491.

Distribution: Malaya, Polynesia.

§ *Leucostegia*.

*D. (Leucostegia) oligophlebia*, Baker, in Jour. Bot. 1888, 323. (13\*) A small graceful fern found by Mr. C. Hose on Mt.

Lambir, in the Baram Residency Sarawak, and by myself on Matang near the top, i.e. at 3,000 ft.

*D. (Leucos.) nephrodioides*, Baker, in Jour. Linn. Soc. xxiv, 257 (16\*) Paku, Sarawak, and Niah, Baram Residency, Sarawak.

*D. (Leucos.) Hosei*, Baker in Jour. Linn. Soc. 1888 p. 323 (17\*) Mt. Lambir, Sarawak.

*D. (Leucos.) parvula*, Wallich (Syn. Fil. xviii 21). Common on trees near the sea-shore, and on Mangrove trees in rivers.  
Distribution: Singapore.

§ *Odontoloma*.

*D. (Odont.) repens*, Desv. (Syn. Fil. xviii, 27.) Mt. Mulu, Sarawak, Mr. C. Hose. The immature plants have often fine wide-creeping rhizomes with short fronds and deeply lobed pinnæ, resembling somewhat those of *Acrostichum sorbifolium* at the same stage of growth = *Lindsaya pectinata*, Bl.  
Distribution: Assam, Neilgherries, Ceylon, Malaya, Polynesian Islands and Mauritius.

§ *Prosaptia*.

*D. (Pros) Emersoni*, Hk. and Gr. (Syn. Fil. xviii, 31). Common on trees.  
Distribution: Madras, Ceylon, Malaya, Philippines.

*D. (Pros) contigua*, Sw. (Syn. Fil. xviii, 32) Mt. Dulit, Sarawak, Mt. Kinabalu. Dr. Haviland.  
Distribution: Ceylon, Malaya, Polynesia.

§ *Endavallia*.

*D. Lobbiana*, Moore (Syn. Fil. xviii, 35). Found by Mr. Thomas Lobb about 1845 and not observed afterwards till 1886 when I met with it in the Sempadi River, a branch of the Tisak in the Batang Lupar Residency, Sarawak.

*D. solida*. Swartz (Syn. Fil. xviii, 39). Common.  
Distribution: Malaya and the Polynesian Islands.

- var *B. candata*, Cav. is said to be found in Borneo Moore, Ind. Fil. p. 300 *teste* Cesati in Fil. Becc Born. p. 12. I have not seen it.

*D. elegans*, Swartz (Syn. Fil. xviii. 40). Kuching; elsewhere - not common.

- var *B. conifolia*, Hk. was found by Beccari on the Undup River, Sarawak, Cesati, Fil, Bec. Born.  
Distribution: Ceylon, Malaya, China, Polynesian Islands, Tropical Australia, Madagascar, Angola, Fernando Po, Johanna Island.

*D. pallida*, Mett. (Syn. Fil. p. 469, 40 \*) = *Dav.* (*Loxoscaphe*) *Beccariana*, Cesati, in Fil Becc. Born. p. 15. Mt. Matang, Jambusan, upper Sarawak, and Niah in the Baram Residency.  
Distribution: Aneiteum.

*D. bullata*, Wallich. (Syn. Fil. xviii. 47.) Lundu, Sarawak,  
Distribution: Hindustan, Malaya, Japan.

*D. Veitchii*, Baker in Jour. Bot, 1879 p. 39. (49\*). Found by Mr. F. C. Burbidge on Mt. Kinabalu in N. Borneo at 6,000 ft.

#### § *Microlepia*.

*D. (Micro) pinnata*. Cav. (Syn. Fil. xviii. 82.) The Sarawak form of this fern corresponds to the variety *D. gracilis* Bl. as described in Syn. Fil: that is to say the lower pinnæ are cut down nearly to the rachis into linear oblong entire, or sub-entire, lobes. But Mr. Baker has given the name *D. gracilis* Bl. = *D. Luzonica* Hk. to the form described below. This is intermediate between that and the type. Mt. Matang 2,500 ft.  
Distribution: (of the type) Malay Peninsula, Penang, Java, Celebes, Polynesian Islands.

- var. *gracilis* Bl. = *D. Luzonica* Hk. (Syn. Fil. xviii. 52 var). Lower pinnæ distinctly bipinnate, the pinnules quite as deeply toothed as the pinnæ of the type. Mt.



Matang and the Baram district, Sarawak.

*D. (Micro) deparioides* Ces. See *Lecanopteris deparioides*, Bk.

*D. (Micro) ciliata*. Hk. (Syn. Fil. xviii, 55). Mr. F. C. Burbidge at Kaung, N. Borneo.  
Distribution: Philippines.

*D. (Micro) Speluncæ*, Baker, (Syn. Fil. xviii, 65). Common in Sarawak and N. Borneo.  
Distribution: Himalayas to Ceylon; Malaya; S. E. China; Polynesian Islands to Norfolk Island; Queensland; West Tropical Africa, Madagascar, Bourbon; Natal; W. Indies to Brazil.

§. *Stenoloma*.

*D. (Sten) tenuifolia* Sw. (Syn. Fil. xviii, 74). Common in many parts of Sarawak, and in North Borneo.  
Distribution: Tropical Asia; Polynesia; Japan; Mascarenes.

— var. *chinensis*, Sm. Mt. Matang, Sarawak. Doubtfully distinct.

LINDSAYA. Gen. xx. Syn. Fil.

§. *Eulindsaya*.

*L. ovata*, J. Sm. (Syn. Fil. xx. 4). Mt. Matang, Sarawak, by Beccari, 1866.

*L. concinna*, J. Sm. (Syn. Fil. xx. 5.) "Borneo" Cesati Fil. Becc. Born. p. 14. "Not distinct specifically from *L. cultrata*, Sw." Baker in *Ferns discovered or described since 1874*.

*L. jamesonioides*, Baker in Jour. Bot. 1879, 89. To the description given there Baker adds, in *Ferns discovered or described since 1874*, "Hook. Ic tab. 1626." Mt. Kinabalu, North Borneo. Mr. F. C. Burbidge. 9,000 ft. and by Dr. G. D. Haviland 5,500 ft.

*L. cultrata*, Swartz (Syn. Fil. xx. 7). The type is common. A form found on Mt. Matang agrees exactly with the description of var B. *L. japonica* in Syn. Fil. Another form the upper edge of which is shallowly lobed is called var. *L. Lobbiana*. Hk. at Kew.

Distribution (of type,) Himalayas, Neilgherries, Malaya, Bourbon, Queensland, Madagascar.

*L. crispa*, Baker in Jour. Bot. 1879. p. 39. In *Ferns discovered or described since 1874* he adds Hook. Ic. tab. 1627. North Borneo, Mr. F. C. Burbidge.

*L. pectinata*, Bl. (Syn. Fil. xx. 10) another name for *Davallia* (*Odontoloma*) *repens*, Dew which see.

*L. scandens*, Hk. (Syn. Fil. xx. 11.) Common. When mature it is bipinnate and quite undistinguishable from *L. trapeziformis*, with which I believe it to be conspecific. It is entirely unlike *L. pectinata* in habit, texture and cutting: and I think it must be through some mistake that it is said in Syn. Fil. to be doubtfully distinct from this last. In young, but fruited forms, it is sometimes found with the pinnae almost imbricated and prettily variegated with white veins.

*L. flabellulata*, Dry. (Syn. Fil. xx. 16.) Common in Sarawak. Distribution: Malaya to S. China; N. India, Ceylon, Australia.

— var. A fern sent to Kew from Mt. Matang, near the summit 13,000 ft, is said by Mr. Baker to be "a much divided form of *flabellulata*." I give a description of it as I am inclined to think it deserving of the honour of being reckoned as a Species.

Rhizomes short creeping, densely clothed with linear-lanceolate brown scales which extend to the basis of the stipes. Stipes otherwise naked, slender, chestnut-brown, 6 in. long, 3-4 in. wide, simply pinnate in the upper part, fully quadripinnatifid in the lower. Ultimate divisions sub-orbicular-cuneate, rather deeply lobed  $\frac{1}{4}$  in. long and as broad. Veins flabellate, once forked in each lobe. Sori

rather narrow, interrupted. Indusium persistent. I have only found it on one occasion.

*L. gomphophylla*. Baker in *Ferns discovered or described since 1874*. "Borneo, Sir Hugh Low."

*L. trapeziformis*, Dry. (Syn. Fil. xx. 17.) Not uncommon probably only the mature form of *L. scandens* Hk.  
Distribution: Tropical America, Malaya, Ceylon.

*L. borneensis*, Hk. M. S. S. (Syn. Fil. xx. 18.) Mt. Matang and elsewhere.  
Distribution: Malay Peninsula in Mountain Forests.

*L. Natunæ*. Baker in Kew Bulletin Feb. 1896. p. 40. Found by Mr. Ernest Hose in the Natuna Islands.

#### § *Isoloma*.

*L.* (Iso.) *indurata*. Baker in Jour. Bot. 1888, p. 324, Niah, Baram Residency, Sarawak and Mt. Kinabalu, North Borneo, Dr. Haviland.

*L.* (Iso.) *divergens*, Wallich, (Syn. Fil. xx. 29.) Common. There are two forms often found in the same locality, both in Borneo and the Malay Peninsula but not in any way running into one another. In the typical form the two edges of the pinnæ are very nearly parallel. In the other form the base is half as long as the pinna, the upper surface is cultrate, curved from the point of the auricle to the extremity of the pinna, and the underside is cut away as in *Asplenium resectum*.  
Distribution: Throughout Malaya.

*L.* (Iso.) *lanuginosa*, Wall. (Syn. Fil. xx. 30.) Growing abundantly with *Neprolepis acuta* which it so curiously resembles, on mangroves by the Salak River, Sarawak.  
Distribution: Singapore and Malay Peninsula; Tropical Australia, Mauritius, Africa, mouth of the Kongone River (Livingstone expedition.)

*L.* (Iso.) *trilobata*, Baker in Jour. Bot. 1891, p. 107. Mt. Mulu, and Niah, Baram District, Sarawak.

§ *Synaphlebium*.

*L.* (Syn.) *lobata*, Biret (Syn. Fil. xx. 37.) Common in Sarawak.  
Distribution: Neilgherries and Ceylon; Malaya; Queensland; Polynesian Islands.

*L.* (Syn.) *davallioides*, Blume, (Syn. Fil. xx. 38.) Common.  
Distribution: Throughout Malaya.

§ *Schizoloma*.

*L.* (Schiz.) *cordata*, Gaud. (Syn. Fil. xx. 39.) Limestone, Mt. Mulu, and Niah, Baram Residency, Sarawak. Rare.  
Distribution: Malayan Peninsula.

*L.* (Schiz.) *ensifolia*, Sw. (Syn. Fil. xx. 41.) Common.  
Distribution: Hongkong, Malaya, Himalayas to Queensland and eastward to Polynesian Islands; Mauritius, Madagascar, Natal, Cape Colony, the Guinea coast.

*L.* (Schiz.) *Fraseri*, Hk. (Syn. Fil. xx. 43.) Banting, Sarawak by Beccari, a sterile specimen only: Cesati in Fil. Becc. Born. p. 15. Considered by Baker to be an *Asplenium* in an immature state, probably *A. nitidum*.  
Distribution: Queensland.

## ADIANTUM. (Gen. xxi. Syn. Fil.)

*A. diaphanum*, Bl. (Syn. Fil. xxi. 15.) North Borneo, Mr. F. C. Burbidge.  
Distribution: Java, S. E. China, Aneiteum, Fiji, New Caledonia, Norfolk Island, New Zealand, N. S. Wales.

*A. Hosei*, Baker in Jour. Bot. 1888, p. 324. On Limestone cliffs at Paku, Upper Sarawak, and in the Baram Residency, Sarawak.

*A. Capillus-Veneris*, L. (Syn. Fil. xxi. 41.) Kudat, North Borneo, on the cliff below the Residency. The only habitat of this cosmopolitan species as yet discovered in Borneo.  
Distribution: Very general in both the old and new world.

In Malaya found also by me in the neighbourhood of Malacca.

- A. stenochlamys*, Baker in *New Ferns*, Ann. Bot. Vol. v. 1891, (58\*). Santubong, Sarawak; Kudat (Dr. Fraser) and Pulo Gaya (Sir H. Low.) British North Borneo.  
Distribution: Malay Peninsula.

CHEILANTHES (Gen. xxv. Syn. Fil.)

- C. tenuifolia*, Sw. (Syn. Fil. xxv. 35.) Common.  
Distribution: Himalayas to Ceylon, Malaya, S. E. China, Polynesian Islands, N. Zealand, Australia and southward to Tasmania.

PTERIS (Gen. xxxi. Syn. Fil.)

§ *Eupteris*.

- P. longifolia*, L. (Syn. Fil. xxxi. 1.) Common; Sarawak, Labuan, N. Borneo.  
Distribution: Tropical and warm temperate regions all round the world.
- P. melanocaulon*, Fec. (Syn. Fil. xxxi. under 4.) Sulu Islands Mr. F. C. Burbidge. Described as *P. Treacheriana* by Baker in Jour. Bot. 1879, p. 65. tab. 5, but stated to be identical with *P. melanocaulon* Fée by Baker in *New Ferns* Ann. Bot. Vol. v. 1891.
- P. ensiformis*, Burm. (Syn. Fil. xxxi. 10.) Kudat and Banggi Island, North Borneo.  
Distribution: Himalayas to Ceylon, Malacca, Chusan and Loo Choo Islands. Southward to Tropical Australia; eastward to Samoa and Fiji.
- P. semipinnata*, L. (Syn. Fil. xxxi. 16.) Gaya, North Borneo.
- P. quadriaurita*, Retz. (Syn. Fil. xxxi. 22.) Common.  
Distribution: All round the world within the Tropics and a little beyond them.
- var. *digitata*, Baker in Jour. Bot. 1879, p. 40 but recognized as identical with the next species by Baker in letter June, 1888.

*P. Grevilleana*, Wall. (22 \*). Beddome F. B. I. p. 112 and Supplement p. 23. Clarke considers it to be more nearly allied to *P. ensiformis* than to *P. quadriaurita*. Smambu on the Saribas River; Baram; and N. Borneo.

Distribution: North India, Malay Peninsula, Tonquin.

*P. furcans*, Baker in Jour. Bot. 1888, p. 324. (22 \*). Baram, Sarawak.

*P. Walkeri*, Baker in Jour. Bot. 1888, p. 324 (22 \*). Banggi Island near Kudat. British North Borneo.

*P. longipinnula*, Wall. (Syn. Fil. xxxi. 23.) Banting, Padih River, etc., Sarawak.

Distribution: Hindostan, Malayan Peninsula, Japan.

#### § *Pæsia*.

*P. (Pæs.) aquilina*, L. (Syn. Fil. xxxi. 40.) Common.

Distribution: All round the world in the Tropics and Temperate Zones.

— var. *arachnoidea*, Kaulf at Beccari. Marup, Batang Lupar River, Sarawak.

[*P. (Pæs.) Radula*, Baker in Jour. Bot. 1880, p. 211. I mention this fern because Baker in *New Ferns*, Ann. Bot. Vol. v. 1891. says "Mountains of Borneo" Beccari, but this is, I think, a misprint for *Sumatra*.]

#### § *Campteria*.

*P. (Campt.) patens*, Hk. (Syn. Fil. xxxi. 47.) Said in Syn. Fil. to be found in *Borneo*. I have not met with it.

Distribution: Ceylon, Malay Peninsula, Philippines and Society Islands.

*P. (Campt.) Waltichiana*, Agardh. (Syn. Fil. xxxi. 50.) Kuching and Samarahan River, and probably elsewhere in Sarawak.

Distribution: Himalayas, Malaya, Philippine Islands, Japan.

#### § *Litobrochia*.

*P. (Lito.) incisa*, Thunb. (Syn. Fil. xxxi. 81.) Sandakan, North Borneo.

Distribution: Throughout the Tropics in both Hemispheres.

— var. *aurita*, Blume, Mt. Matang, Sarawak.

*P. (Lito.) marginata*, Bory = *P. tripartita*. Sw. (Syn. Fil. xxxi. 82.) Baram, Sarawak.

Distribution: Malaya, Polynesian Islands, Queensland, Ceylon, Sylhet, Seychelles, Mauritius, Kaffraria and West Tropical Africa.

CERATOPTERIS. (Gen. xxxii. Syn. Fil.)

*C. thalictroides*, Brong: (Syn. Fil. xxxii. 1.) Common in ditches.

Distribution: Throughout the Tropics in quiet waters.

LOMARIA. (Gen. xxxiii. Syn. Fil.)

*L. procera*, Spreng. (Syn. Fil. xxxiii. 22.) Mt. Matang, Sarawak 3,000 ft.

Distribution: Mexico and W. Indies to Chili; Malaya and Polynesian Islands, New Zealand, S. Australia, Tasmania and S. Africa.

*L. (Plagiogyria) pycnophylla*, Kunze (Syn. Fil. xxxiii. 38.) Mt. Dulit, Sarawak 4,000 to 5,000 ft.

Distribution: Malaya, and N. Hindustan ascending to 10,000 ft.

*L. egenolfioides*, Baker, So named by him in a letter—I have not yet seen his description. Mt. Dulit, Sarawak 5,000 ft. Mr. C. Hose 1892.

BLECHNUM. (Gen. xxxiv. Syn. Fil.)

*B. serrulatum*, Rich. (Syn. Fil. xxxiv. 14.) where "Borneo" is given as a habitat. I have not heard of it there.

Distribution: Malaya, New Caledonia, Australia, Florida, W. Indies, Guiana, Brazil.

*B. orientale*, Linn. (Syn. Fil. xxxiv. 15.) Common. Some of the fronds on a large plant are occasionally found in a beautiful bi-pinnate form in several places in Borneo.

Distribution: Australia and Polynesian Islands northward to S. China and the Himalayas.

- B. Finlaysonianum*, Wall. (Syn. Fil. xxxiv. 17.) Common.  
Distribution: Malayan Peninsula.

ASPLENIUM. (Gen. xxxviii. Syn. Fil.)

§ *Thamnopteris*.

- A. (*Thamn*) *Nidus*, L. (Syn. Fil. xxxviii. 1.) Common.  
Distribution: Mauritius, Johanna Island, Seychelles,  
Malaya, Japan, Bonin, Chusan, Society Islands; New Caledonia,  
Queensland, Norfolk Island, Lord Howe's Island.  
— Var. *B. musæfolium*, Mett. Size as in Syn. Fil. but sori  
coming far short of the edge. Common.  
— Var. *Phyllitidis*, Don. Common.

§ *Euasplenium*.

- A. *microziphion*, Baker. (10\*) Kew Bulletin, Feb. 1896, p. 40  
Natuna Islands, Mr. Ernest Hose.  
A. *squamulatum*, Bl. (Syn. Fil. xxxviii. 10.) Kuching and  
Niah and Mt. Lambir in the Baram district, Sarawak;  
North Borneo, Burbidge.  
Distribution: Malaya and Philippines.  
A. *scolopendrioides*, J. Sm. (Syn. Fil. xxxviii. 11.) "A frag-  
ment from Borneo exhibits the same raised line where  
the involucre bursts, but the stem is much longer." Syn.  
Fil. Not seen.  
Distribution: Philippines.  
A. *Natunæ*, Baker. (17\*) Kew Bulletin, Feb. 1896. Natuna  
Islands, Mr. Ernest Hose.  
A. *longissimum*, Bl. (Syn. Fil. xxxviii. 49). Banting, Sarawak.  
Distribution: Malaya, Mauritius.  
A. *Wightianum*, Wall. (Syn. Fil. xxxviii. 50). This was found  
in a quite typical form by Mr. A. H. Everett on the Na-  
tuna Islands.  
Distribution: Madras, Ceylon.



- A. vulcanicum*, Bl. (Syn. Fil. xxxviii, 59). Mt. Matang, Lundu ; Niah in the Baram district. Mr. Baker says of this form which is the same in the three places, "receding from the type towards the Ceylon *A. Wightianum*."  
Distribution : Malay Peninsula and adjacent Islands.
- A. tenerum*, Forst (Syn. Fil. xxxviii, 61). On trees near the Samarahan River and elsewhere.  
Distribution : Ceylon, Malaya, Polynesia.
- A. persicifolium*, G. Sm. (Syn. Fil. xxxviii, 65). Sulu Islands, Mr. F. C. Burbidge. Kinabalu, 3,000 ft., Dr. G. D. Haviland.  
Distribution : Philippines and Sandwich Islands.
- A. fuliginosum*, Hk. (Syn. Fil. xxxviii, 67). Borneo, Sir Hugh Low. Not seen by me.
- A. borneense*, Hk. (Syn. Fil. xxxviii, 68), North Borneo, Sir Hugh Low, and Dr. G. D. Haviland.  
Distribution : Perak, Malay Peninsula.
- A. hirtum*, Kaulf. (Syn. Fil. xxxviii, 78). Sandakan, North Borneo. This is the *A. pellucidum*, Lam, in Cesati's Fil. Becc. Born. p. 20.  
Distribution : Mauritius, Seychelles ; Malaya : Hongkong and Philippines : Ladrones and Solomon Islands.
- A. falcatum*, Lam. (Syn. Fil. xxxviii, 94). Sulu Archipelago, Mr. F. C. Burbidge. Niah Sarawak.  
Distribution : Malaya, Ceylon, Indian Peninsula, Polynesia, Australia, New Zealand ; Mascaren Islands, Zambesi Land.
- A. caudatum*, Forst. (Syn. Fil. xxxviii, 95). North Borneo, Mr. F. C. Burbidge.  
Distribution, Malaya, Hindostan ; Polynesia, Australia : Comoros, Angola, Ecuador : Brazil.
- A. macrophyllum*, Sw., (Syn. Fil. xxxviii, 97). Mt. Matang, Lundu, Paku, etc. Sarawak.  
Distribution, Malaya, Himalayas, Neilgherries ; Hongkong ; Polynesia ; Mauritius ; Johanna Island.

- A. resectum*, Sm. (Syn. Fil. xxxviii, 102). Mt. Matang, Niah, etc. Sarawak. "*A. unilaterale*, Lam. is an older name for this species" Baker in *New Ferns Ann. Bot. Vol. v.* 1891. Distribution: Malaya, Himalayas and Japan southward to Ceylon, Oahu and Fiji; Mauritius, Seychelles, Bourbon, Angola, Guinea coast.
- A. heterocarpum*, Wall. (Syn. Fil. xxxviii, 104). Said in Syn. Fil. to have been found in Borneo; locality not given. Distribution: Himalayas to Ceylon; Malay Peninsula; S. E. China.
- A. subaquatile*, Cesati, in Fil. Becc. Born. (107\*). First found by Beccari in the Rejang River. I have seen it in the Sarawak, Undop, Skerang, Saribas, and Krian Rivers. It grows on the trunks of trees overhanging the stream, generally on the side which faces up-river, not far above the water. Cesati considered it to belong to the § *Darea*. Baker by giving it his number 107\* in *New Ferns Ann. Bot. Vol. v.* 1891, places it here.
- A. cuneatum*, Lam. (Syn. Fil. xxxviii, 124). North Borneo, Mr. F. C. Burbidge; Natuna Islands Mr. A. H. Everett. Distribution: Tropical America; Polynesian Islands; Malaya; Cape Colony to Mozambique, Johanna Island, Seychelles, Bourbon.
- A. affine*, Swartz. (Syn. Fil. xxxviii, 126). North Borneo; Mt. Matang and Niah, Sarawak. This is *A. spathulinum*, G. Sm. in Cesati Fil. Becc. Born. p. 20. Distribution: Tropical America, West Indies to Brazil; Polynesia; Java, Malay Peninsula; Hongkong; Cape Colony to Mozambique, Bourbon, Johanna Island, Seychelles.
- A. nitidum*, Swz. (Syn. Fil. xxxviii, 127). Common. The stem is invariably ebeneous and glossy in the Malayan plant, not "greyish" as in Syn. Fil. This is *A. polystichoides*, Bl. in Cesati Fil. Becc. Born. p. 20. Distribution: Malaya, Ceylon, North of India.

*A. laserpitifolium*, Lam. (Syn. Fil. xxxviii, 128). North Borneo, Mr. F. C. Burbidge and Dr. Haviland.

Distribution : Polynesian Islands and northward to Chusan and Assam.

§ *Darea*.

*A. (Dar) dichotomum*, Hooker, (Syn. Fil. xxxviii, 160). Mt. Kinabalu, North Borneo, 5,000 ft. by Sir Hugh Low, Mr. F. C. Burbidge, and by Dr. Haviland. A specimen brought by the last corresponds with the description in Syn. Fil. excepting that the *ultimate segments* are not  $1\frac{1}{2}$  to 2 lin. l. and  $\frac{1}{4}$  in. broad! Probably there is a printer's error here.

*A. (Dar) Belangeri*, Kunze, (Syn. Fil. xxxviii, 168). Mt. Matang and Niah, Sarawak: Sulu, Mr. Burbidge.

Distribution : New Guinea and the Philippines.

§ *Diplazium*.

*A. (Dipl.) porphyrorachis*, Baker in Jour. Bot. 1879. p. 40. Sarawak and North Borneo. Called *A. (Dipl) zeylanicum*, Hooker, in Cesati Fil. Becc. Born. This is *Polypodium subserratum* Hk. of Syn. Fil. named from an immature, sterile plant gathered by Wallace.

*A. (Dipl.) pallidum*, Bl. (Syn. Fil. xxxviii, 205). Sulu Islands, Mr. F. C. Burbidge.

Distribution : Malaya, Philippines.

*A. (Dipl.) æquibasale*, Baker in Jour. Linn. Soc. xxii, p. 225. (205\*) Banks of the Sarawak and Undop Rivers.

*A. (Dipl.) porrectum*, Wall. (Syn. Fil. xxxviii, 206) Common in Sarawak and N. Borneo.

Distribution : Malaya.

*A. biseriale*, Baker (209\*) Linn. Soc. Trans. iv. p. 252. — Mt. Kinabalu 3,000 ft. Dr. Haviland.

*A. (Dipl) xiphophyllum*, Baker in Jour. Bot. 1879 p. 40. (207\*) First discovered by Mr. F. C. Burbidge in North Borneo. I have since found it in Perak, Malay Peninsula.

*A. (Dipl) bantamense* Baker. (Syn. Fil. xxxviii. 210.) Banting,

Matang, Lundu and other places in Sarawak.

Distribution: Malaya, Himalayas, Hongkong, Aneiteum.

- A. (*Dipl.*) *sylvaticum*, Presl. (Syn. Fil. xxxviii. 207.) Borneo is given as a habitat of this Fern in Syn. Fil. I have not met with it there.
- A. (*Dipl.*) *tomentosum*, Hk. (Syn. Fil. xxxviii. 224.) Not uncommon on the hills of Sarawak generally.  
Distribution: Malaya, Khasia.
- A. (*Dipl.*) *sorzogonense*, Presl. (Syn. Fil. xxxviii. 233.) Mt. Dulit, Sarawak. Mr. C. Hose.  
Distribution: Malaya, Himalayas, Philippines.
- A. (*Dipl.*) *crinitum*, Baker in Jour. Linn. Soc. xxiv. 258. Lingga Mountain, Paku, and Niah, Sarawak. This is the Fern which was described as A (*Dipl.*) *sorzogonense*. var. *Majus* Hk. from a specimen sent home by Lobb.
- A. (*Dipl.*) *polypodioides*, Mett. (Syn. Fil. xxxviii. 244.) Sari-bas River, Sarawak and elsewhere.
- A. (*Dipl.*) *maximum*, Don. (Syn. Fil. xxxviii. 246.) This Fern which in *New Ferns* Ann. Bot. Vol. v. 1891 Mr. Baker seems disposed to place under *A. latifolium*, Don. as Beddome does, is both in the Malay Peninsula and Borneo exceedingly different from the latter fern as represented in the specimens sent to me from the Himalayas and Ceylon. The Malayan Fern is well described in Syn. Fil. excepting that the limits of its dimensions should be extended in both directions. I have specimens with the secondary pinnae 5 in. long by  $1\frac{1}{8}$  in. broad cut half-way down into rounded sub-falcate lobes; and others in which they are  $1\frac{1}{2}$  in. long by  $\frac{1}{4}$  in. broad with edges merely serrate. It is common on the hills of Sarawak.  
Distribution: Malaya, Ceylon to North India.
- A. (*Dipl.*) *sp.* A Fern found on Matang which I have twice sent to Kew (No. 74) and which is placed by Mr. Baker under *A. maximum*, Don. seems to me to be a very distinct species. The following is a description of it. Stipes tufted 2 or

more feet long with rather broad pale-brown scales at the base, otherwise naked, pale green when living, as is the whole frond. Frond  $1\frac{1}{2}$  to 3 ft. long, 1 ft. broad in the middle, tripinnatifid, the lowest pinnæ much the longest, up to 1 ft. but curved and ascending, so that in general outline the frond is elliptical rather than deltoid. Pinnules 1 to 2 in. long falcate unequal-sided, acute, the lower side narrowed very gradually towards the base, and therefore much curved, entire, or crenate in the upper part; the upper side narrowed suddenly, auricled, the base parallel with the rachis, beyond the auricle cut down about  $\frac{1}{3}$  into rounded finely serrate lobes. Veins pinnate in the lower part, simple in the upper. Sori fine reaching neither the midrib nor the edge.

The whole fern is, when living, very flaccid and herbaceous differing in this respect as well as in the form of the whole frond and of its several parts from the robust habit of *A. maximum*. I have named it provisionally *A. (Dipl.) Matangense*.

- A. (Dipl.) vestitum*, Presl. (Syn. Fil. xxxiii. 248.) Borneo, fide Moore, as stated by Cesati in Fil. Becc. Born. p. 22.  
Distribution: Philippines.
- A. (Dipl.) Blumei*, Bergsm. This is in Cesati's list, but I do not know it.
- A. (Dipl.) latifolium*, Don. (Syn. Fil. xxxviii. 249.) Found by Burbidge in N. Borneo, see Baker in Jour. Bot. 1879. p. 41.  
Distribution: Ceylon and Neilgherries; Sumatra; Philippines; S. China.
- A. (Dipl.) latifolium*, Don. "Variety" Baker. This I have found only once, on Lingga Mountain in Sarawak. It has pinnæ  $1\frac{1}{2}$  ft. long, 5 in. wide at the base, pinnatifid at the apex, and below that 12-15 pairs of nearly opposite, stalked, deltoid-lanceolate pinnules, 2 in. l. by  $\frac{3}{4}$  in. broad cut down nearly to the base into oblong, or slightly falcate segments, the lower ones crenate on the upper side. I think it is probably a distinct species.

§ *Anisogonium*.

- A. (Aniso.) cordifolium*, (Syn. Fil. xxxviii, 266.) Banting, Mt. Matang and elsewhere in Sarawak.  
Distribution : Malaya and Philippines.

—Variety. *A. (Aniso.) integrifolium* Bl. and other forms connecting this and *A. lineolatum* Banting, Sarawak.

- A. (Aniso.) lineolatum* Mett. (Syn. Fil. xxxviii, 268.) Banting, Sarawak. This is the *A. elegans* Mett. of Oesati in Fil. Becc. Born.  
Distribution : Malaya, Philippines.

- A. (Aniso.) decussatum*, Sw. (Syn. Fil. xxxviii, 270). The Limbang River and the Baram district, Sarawak ; = *A. proliferum*, Lam. a very good name as it is chiefly propagated by little bulbules, which are formed in the axils of the pinnæ, and in due time fall off and take root.  
Distribution : Malaya, Polynesia, Queensland, Mascaren Islands, Angola, Guinea Coast.

- A. (Aniso.) esculentum*. Presl. (Syn. Fil. xxxviii 274.) Common. Much used as an article of food. It is the "*Paku amai*" = *Filix vera*, of the Dyaks.  
Distribution : Malaya, Ceylon to Himalayas, Hongkong, Formosa.

## TRIPHLEBIA. (Gen. xli\* Syn. Fil.)

A new genus taken out of *Scolopendrium*, described by Baker in *New Ferns Ann. Bot. Vol. v.* 1891.

- T. longifolia* Baker. in *Malesia III.* 41 = *Scolopendrium longifolium* Presl. Niah, Sarawak, Mr. C. Hose.  
Distribution : Philippines.

## DIDYMOCHLENA (Gen. xlii. Syn. l il.)

- D. lunulata* Desv. (Syn. Fil. xlii. 1.) The Western side of Mt. Matang, Sarawak at 1,000 ft.  
Distribution : Throughout the Tropics of both hemispheres.

*D. polycarpa*, Baker. (Syn. Fil. xlii. 2). Not uncommon just above the low lands Sarawak. I give this Fern the place it holds in Syn. Fil. but agree with Col. Beddome that its proper place is in the genus *Nephrodium*; see his *Supplement to the Ferns of British India* p. 74.  
Distribution: Malaya.

ASPIDIUM. (Gen. xliii, Syn. Fil.)

§ *Polystichum*.

*A. (Polyst.) semicordatum*, Sw. (Syn. Fil. xliii. 4.) Mt. Matang and the Baram district, Sarawak.

Distribution: Malaya; Philippines; Tropical America from Cuba and Panama to Brazil and Peru.

*A. (Polyst.) aculeatum*, Sw. (Syn. Fil. xliii. 18). North Borneo, Mr. F. C. Burbidge, Kinabalu Dr Haviland.

Distribution: Throughout the world.

*A. (Polyst.) aristatum*, Sw. (Syn. Fil. xliii. 37). Lingga Mountain, Sarawak.

Distribution: Japan and Himalayas to Ceylon: N. S. Wales, Norfolk Island, Fiji, Samoa; Natal.

— Var. *Hamiltonii*, Spr. (Syn. Fil. xliii, under 37). Mts. Matang and Santubong, Sarawak.

§ *Euaspidium*.

*A. platanifolium*, Mett. (Syn. Fil. xliii, 50). Mt. Matang, and Lundu, Sarawak.

Distribution: Malaya.

*A. repandum*, Willd. (Syn. Fil. xliii. 53). Pulo Gaya, Pulo Banggi and Limestone districts of the Upper Sarawak River,

Distribution: Philippines.

*A. membranaceum*, Hk. (Syn. Fil. xlii. 55). At the mouth of Limestone caves, Sarawak.

Distribution: Ceylon, Java, Philippines, W. China, Formosa.

## NEPHRODIUM. (Gen. xlv. Syn. Fil.)

§ *Lastrea*.

*N.* (Last.) *gymnopodium*, Baker, Trans. Linn. Soc. No. iv, p. 249 (17 \*). Mt. Kinabalu 10,500 ft. Dr. Haviland.

*N.* (Last.) *immersum*, Hk. (Syn. Fil. xlv. 23.) Lundu and Upper Sarawak.

Distribution: Malaya, Assam, Philippines, N. Caledonia.

*N.* (Last.) *calcaratum*, Hk. (Syn. Fil. xlv. 29.) Mt. Matang, and Mt. Dulit, Sarawak.

Distribution: Malaya, Ceylon to N. India, Philippines, Hongkong.

*N.* (Last.) *viscosum*, Baker (Syn. Fil. xlv. 30.) Found in Borneo by T. Lobb. locality not given.

Distribution: Malacca, Perak, Philippines.

*N.* (Last.) *Creaghii*, Baker in Kew Bulletin for September 1898, p. 280 (35\*). British North Borneo by Mr. C. V. Creagh.

*N.* (Last.) *crassifolium*, Hk. (Syn. Fil. xlv. 40.) Mt. Matang, Sarawak.

Distribution: Malaya, Philippines.

— var. *Motleyanum*, Hk. M. S. S. (Syn. Fil. in a note to the last sp.) Found on Matang. This form is invariably larger, and coarser than the type.

*N.* (Last.) *Beccarianum*, Cesati, Fil. Becc. Born. p. 23. (40 \*.) Mt. Matang by Beccari, and Mt. Dulit by Mr. C. Hose.

*N.* (Last.) *echinatum*, Baker (Syn. Fil. xlv. 41.) Said to have been found in Borneo by Korthals. (Syn. Fil.) Not seen by me.

*N.* (Last.) *polytrichum*, Baker in Jour. Bot. 1891, p. 107. (41\*). On Lingga Mountain and on Mt. Dulit.

*N.* (Last.) *borneense*, Hooker (Syn. Fil. xlv. 81.) Paku, Upper Sarawak.

*N.* (Last.) *sparsum*, Don. (Syn. Fil. xlv. 94.) Mt. Dulit, Sarawak.

Distribution: Malaya, Ceylon to N. India, China, Mauritius.

*N.* (Last.) *dissectum*, Desv. (Syn. Fil. xlv. 126.) Limestone districts, Sarawak, Jambusan and Niah.



Distribution: Malaya, Ceylon to N. India, Philippines to Samoa, S. W. Australia, Madagascar.

*N.* (Last.) *sarawakense*, Baker in Jour. Linn. Soc. xxii. p. 225. (131\*.) Banks of the Sarawak and Undop Rivers.

*N.* (Last.) *aciculatum*, Baker, Jour. Linn. Soc. xxii. p. 226 (131\*.) Mt. Matang, Sarawak, common there, not seen elsewhere.

*N.* (Last.) *setigerum*, Baker (Syn. Fil. xlv. 139.) Kuching and Lundu, Sarawak.  
Distribution: Ceylon to N. India, Malaya, China, Japan, Polynesia.

*N.* (Last.) *multisetum*, Baker, Jour. Linn. Soc. xxii. p. 226 (139\*), Mt. Matang, Sarawak, 2,000 ft. A beautiful Fern exceedingly rare.

*N.* (Last.) *megaphllyum*, Baker, Jour. Linn. Soc. xxii. p. 227. Sebetan River, Sarawak, epiphytal. Found also in Perak, Malay Peninsula.

#### § *Eunephrodium*.

*N.* *unitum*, B. Br. (Syn. Fil. xlv. 162.) Sarawak, not common there.  
Distribution: Tropical regions and somewhat beyond them, all round the world.

*N.* *oosorum*, Baker, Kew Bulletin Feb., 1896 p. 41 (168\*). Pulo Gaya, N. Borneo.

*N.* *pteroides*, J. Sm. (Syn. Fil. xlv. 164.) North Borneo by Mr. Burbidge.  
Distribution: Malaya, Ceylon to Himalayas, Philippines, China, Queensland, Polynesia.

*N.* *procurrens*, Baker, (Syn. Fil. xlv.) very common. Doubtfully distinct from *N. molle*, Desv.  
Distribution, Throughout Malaya.

*N.* *cucullatum*, Baker, (Syn. Fil. xlv. 171.) Common.  
Distribution: Malaya, Ceylon to N. India, Mascaren Islands, Fiji.

- N. Hænkeanum*, Presl, (Syn. Fil. xliv, 172.) North Borneo and  
Lundu, Sarawak.  
Distribution, Malaya, Ceylon, Fiji.
- N. glandulosum*, J. Sm. (Syn. Fil. xliv, 177.) Banting, Sarawak = *N. lineatum*, Mett.  
Distribution, Malaya, Assam, Philippines.
- N. Arbuscula*, Desv. (Syn. Fil. xlii, 179.) Banks of the Sarawak River. "A large variety." Baker.  
Distribution, Ceylon, Neilgherries, Mascaren Islands, Amboynay, Philippines, Solomon Island.
- N. simulans*, Baker in Jour. Bot. 1888 p. 325 (182\*) Limestone districts Sarawak. *e. g.* Paku and Niah. Mr. Baker has so named this new species, perhaps forgetting that he had given the same specific name to his *Nephrodium* (*Sagenia*) *simulans*. = *Pleocnemia Thwaitesii*. Beddome, F. B. I. p. 223.
- N. hispidulum*, Baker (Syn. Fil. xliv 186.) Mt Gading, Lundu, Sarawak.  
Distribution, Malaya, Philippines.
- N. molle*, Desv. (Syn. Fil. xliv 187) Niah, Sarawak, Mr. C. Hose. Stipes decidedly tufted, as in the description, and so differing from the common form *N. procurrens* Baker.  
Distribution: Himalayas to Ceylon, Malaya, Hongkong, Australia, New Zealand; Mascaren Islands; Cape Colony, Guinea Coast and W. African Islands; Cuba and Mexico to Peru and Brazil.
- N. heterocarpon*. Moore, (Syn. Fil. xliv, 188.) Kuching and Matang, Sarawak.  
Distribution: Malaya and Hongkong.
- N. ferox*, Moore. (Syn. Fil. xliv, 192.) Matang, Sarawak 2,000 ft. The Sarawak form is typical excepting that the hairs on the stipe are always brown instead of black. In the

Malay Peninsula they are often black as described in Syn. Fil.

Distribution: Malay Peninsula, Java, Kumaon, Philippines, Celebes.

*N. truncatum*, Presl. (Syn. Fil. xlv, 194.) Saribas, Matang, Baram District, Sarawak.

Distribution: Malaya, Ceylon to N. India, Australia, Polynesia.

§. *Pleocnemia*.

*N. (Pleoc.) Leuzeanum*, Hooker, (Syn. Fil. xlv, 200.) Common in Sarawak. Island of Balabac.

Distribution: Malaya, N. India, Hongkong, Philippines, Samoa, Fiji.

§. *Sagenia*.

*N. (Sag.) singaporeanum*, Baker (Syn. Fil. xlv, 201.) Mt. Matang, Sarawak 1,000 ft.

Distribution: Malaya.

*N. (Sag.) pteropodium*, Baker, Jour. Bot. 1888, p. 325 (201\*) Mt Matang, and elsewhere in the Baram district, Sarawak. I am doubtful whether this is not a simple form of *N. (Sag.) vastum*, Baker.

*N. (Sag.) ternatum*, Baker, (Syn. Fil. xlv. 202.) Banting, Sarawak, and N. Borneo (Burbridge).

*N. (Sag.) Everettii*, Baker, Kew Bulletin Feb. 1896, p. 41. (202\*) Natuna Islands, Mr. A. H. Everett.

*N. (Sag.) vastum*. Baker (Syn. Fil. xlv. 203.) Mt. Matang, Mt. Lambir in the Baram district, Sarawak.

Distribution: Malaya, Himalayas.

*N. (Sag.) melanocaulon*, Baker (Syn. Fil. xlv. 204.) by Mr. Burbridge in Sulu.

Distribution: Malaya, Himalaya, Philippines.

*N. (Sag.) Lobpii*, Baker (Syn. Fil. xlv 207) Banks of the Sarawak River. First found by Lobb.

*N. (Sag.) subdigitatum*, Baker, Jour. Linn. Soc. xxiv, p. 259. Niah in the Baram District, Sarawak.

- N. (Sag.) semibipinnatum*, Baker, (Syn. Fil. xliv. 208.) On a branch of the Sarawak river near Quop. Here as elsewhere just where the river water ceases to be salt.  
Distribution : Malay Peninsula and adjacent Islands.
- N. (Sag.) polymorphum*, Baker, (Syn. Fil. xliv. 211.) Common in Sarawak, and North Borneo.  
Distribution : Malaya ; Ceylon to Himalayas.
- N. (Sag.) decurrens*, Baker (Syn. Fil. xliv. 217.) Mt. Matang and the banks of the Sebetan River.  
Distribution : Malaya, Ceylon to N. India ; Philippines ; Formosa ; Aneiteum and Samoa.
- N. (Sag.) Hosei*, Baker (219 \*) so re-named by Baker in *New Ferns Ann. Bot Vol. v. 1891* = *N. stenophyllum*, Baker ; Jour. Linn. Soc. xxii p. 227 ; tab. 11 (non Jour. Bot. 1884 p. 363.) River Banks of the Undop and Krian Rivers, Sarawak.
- N. (Sag.) nudum*, Baker, Jour. Bot. 1879, p. 41 (219 \*). Found in N. Borneo by Mr. Burbidge.
- N. (Sag.) melanorachis*, Baker, Jour. Bot. 1888, p. 325. (221 \*) Near the Jambusan limestone caves, Upper Sarawak and at Niah.

NEPHROLEPIS (Gen. xlv. Syn. Fil. p. 300.)

- N. exaltata*, Schott. (Syn. Fil. xlv. 2.) Banks of the Krian River, Sarawak.  
Distribution : N. India to Ceylon ; Malaya ; Chusan to Queensland ; Polynesia ; Mauritius, Angola, Zambesi Land, Guinea coast ; Cuba, the Bahamas and Mexico to Peru and Brazil.
- N. volubilis*, J. Sm. (Syn. Fil. xlv. under 2 ; see *New Ferns Ann. Bot. Vol. v. 1891 Baker.*) Kuching, and Lundu, Sarawak.  
Distribution : Malay Peninsula and adjacent islands.
- N. acuta*, Presl. (Syn. Fil. xlv. 3.)  
Distribution : Almost the same as *N. exaltata*. A pretty

bipinnatifid form of this Fern introduced into Singapore by the late Sultan of Johore from Kew, and thence into Kuching by me about 15 years ago, has become almost naturalized in the neighbourhood of the chief settlements.

OLEANDRA. (Gen. xlv. Syn. Fil. p. 302.)

*O. bantamensis*, Kze. Described by Cesati in Fil. Becc. Born. p. 24. Banting, Sarawak, by Beccari.

*O. neriiiformis*, Cav. (Syn. Fil. xlv. 1.) Kuching, Sarawak.  
Distribution: Malaya, N. India, Philippines, N. Guinea; Fiji, Samoa, Aneiteum; Guinea Coast; N. Granada and Guiana to Brazil and Peru.

— Var. *phyllarthron*, Kze. (Syn. Fil. xlv. under 1.) Santubong, Sarawak.

— Var *brachypus*, Hook, Ces. Fil. Becc. Born. p. 24. Banting, Sarawak, by Beccari.

*O. muscifolia*, Cav. (Syn. Fil. xlv. 2.) Gunong Ayer, Sarawak.  
Distribution: Malaya, Ceylon.

## TRIBE II. POLYPODIEÆ.

POLYPODIUM. (Gen. xlviii. Syn. Fil. p. 304.)

§ *Euphegopteris*.

*P.* (Pheg.) *oxyodon*, Baker, Jour. Bot. 1879 p. 66. (27 \*) Sulu Islands, by Burbidge.

*P.* (Pheg.) *subarboreum*, Baker, Jour. Linn. Soc. xxiv. p. 259 (50 \*) Niah in the Baram District, Sarawak.

§ *Goniopteris*.

*P.* (Goniopt.) *holophyllum*, Baker, Jour. Bot. 1888, 325. (57\*) Niah Sarawak.

*P.* (Goniopt.) *borneense*, Hooker. (Syn. Fil. xlviii. 59.) "Borneo" locality not given. Collected by Lobb, and not since met with.

*P. (Goniopt.) wrophyllum*, Wall. (Syn. Fil. xlviii. 64.) Common in Sarawak, and British North Borneo. Beddome transfers this species to *Nephrodium*.  
Distribution: Malaya, Ceylon to N. India, Chusan, Aneiteum and Queensland.

*P. (Goniopt.) firmulum*, Bk. Kew Bulletin, Aug. 1893 (64\*) Mt. Dulit, Sarawak.

§ *Dictyopteris*.

*P. (Dicty.) Barberi*, Hk. (Syn. Fil. xlviii. 81.) Mt. Matang, Mt. Lambir in the Baram District, Sarawak: Pulo Gaya in North Borneo. This should be placed among the *Sagenias*.  
Distribution: Malaya.

*P. (Dicty.) difforme*, Mt. Matang and Bl. (Syn. Fil. xlviii. 88) the Baram District. This too is a *Sagenia*.  
Distribution: Malaya.

§ *Eupolypodium*.

*P. minimum*. Bk. Jour. Bot. 1879, p. 41 (91\*). First found by Burbidge in N. Borneo, afterwards by me on Mt. Matang.

*P. congener*. Hk. = *Grammitis congener*, Bl. Fil. Jav. tab. 46, fig 3. See Baker. *New Ferns* Ann. Bot. Vol. v. 1891. (99\*) Mt. Dulit, Sarawak.  
Distribution: Java and Sumatra.

*P. (Grammitis) bisulcatum*, Hooker, (Syn. Fil. xlviii. 104.) "Borneo," locality not given. Discovered by T. Lobb. I have not seen it.

*P. (Grammitis) gramineum*, Sw. (Syn. Fil. xlviii. 105.) Mt. Tiang Laju, Batang Lupar district, Sarawak, by Beccari recorded by Cesati in Fil. Becc. Born. p. 24 but not repeated by Beccari himself in his *Felcidi Borneo, Malesia* Vol III.  
Distribution: West Indies, Guiana.

*P. (Grammitis) Havilandi*, Bk. Jour Linn. Soc. iv. p. 253. (107\*) Mt. Kinabalu, N. Borneo 10,500 ft. by Dr. Haviland.

- P. (Grammitis) sessilifolium*, Hk. (Syn. Fil. xlviii. 109.) Mt. Gading, Sarawak, quite at the top 2,000 ft. (See below.)  
Distribution: Philippines and Malaya.
- [*P. (Grammitis) Maxwellii*, Baker. Kew Bulletin Aug. 1896 p. 211. Col. Beddome informs me that he pointed out to Mr. Baker that it is really identical with small specimens of *P. sessilifolium*, Hooker; and that Mr. Baker on making the comparison agreed with him.]
- P. flabellivenium*, Baker. (Syn. Fil. xlviii. 112.) Mt. Lingga and Mt. Dulit, Sarawak; and N. Borneo by Burbidge. First collected by Signor Beccari.
- P. alternidens*, Cesati, Fil. Becc. Born. p. 25, tab. 2. fig. 4. (119\*). Mt. Matang, Sarawak. Found first by Beccari, and afterwards in N. Borneo by Burbidge.
- P. cucullatum*, Nees (Syn. Fil. xlviii. 121.) "Borneo" without precise locality by Low, and afterwards by Dr. Haviland on Mt. Kinabalu at 10,500 ft.  
Distribution: Malaya, Ceylon, New Guinea, Philippines, Polynesia.
- [*P. subserratum*, Hk. (Syn. Fil. xlviii. 129.) So named by Hooker from a specimen without fruited fronds discovered by Wallace, turns out to be an *Asplenium*, A. (Dipl.) *porphyrorachis*, Baker, which see.]
- P. barathrophyllum*, Baker. Jour. Bot. 1891 p. 107 (129\*) Mt. Mulu.  
Distribution: Perak, Malay Peninsula.
- P. decipiens*, Mett. (Syn. Fil. xlviii. 130\* p. 508.) "Borneo" locality not given, nor collector's name. Cesati says Korthals in Fil. Becc. Born. p. 25. Not seen by me.
- P. Burbidgei*, Baker, Jour. Bot. 1879. p. 42. (131\*) Lawas River, North Borneo by Burbidge.
- P. ...*, Baker, Jour. Bot. 1879 p. 42. (132\*) North Borneo by Burbidge, and on Mt. Dulit, Sarawak.  
Distribution: Singapore.

- P. repandulum*, Mett. (Syn. Fil. xlviii. 149). Mt. Matang and Mt. Gading, Sarawak.  
Distribution : Ceylon.
- P. minutum*, Bl. (Syn. Fil. xlviii, 151). North Borneo by Burbidge.  
Distribution : Malay Isles, Ceylon, Philippines.
- P. celebicum*, Bl. (Syn. Fil. xlviii, 160). "Borneo," locality and collector not given. Not seen by me.  
Distribution : Celebes, Sumatra.
- P. decorum* Brack. (Syn. Fil. xlviii, 168). Santubong, Matang, Quop and Mt. Lambir, Sarawak.  
Distribution : Malaya, Ceylon, Philippines to Tahiti and Sandwich Islands.
- P. nutans*. Bl. Fil. Jav. tab. 86 A : Baker in Jour. Bot. 1880, 214. (168\*) Noticed in Syn. Fil. under *P. decorum* but now recognized as specifically distinct. Mt. Dulit, Sarawak.  
Distribution : Java and Sumatra.
- P. blechnoides*. Hook. (Syn. Fil. xlviii. 169). Borneo without specifying locality : Kinabalu, 10,500 ft. by Dr. Haviland.  
Distribution : Polynesia, Queensland.
- P. Lobbianum*, Hk. Syn. (Fil. xlviii, 170). Borneo, no locality given, by Thomas Lobb. I have not seen it.
- P. papillosum*, Bl. (Syn. Fil. xlviii, 174). Mt Matang on the western slope. North Borneo by Burbidge.  
Distribution : Perak, Malay Peninsula ; Java ; Philippines.
- P. Cesatianum*, Baker. Jour. Bot. 1879. p. 24. (175\*) described as *P. papillosum* Bl. by Cesati in Fil. Becc. Born. ; Mt Matang by Beccari, N. Borneo by Burbidge.
- P. Leysii*, Baker Jour. Bot. 1879. p. 66 (175\*). Found by Mr. Burbidge in the Sulu Islands, not elsewhere as yet.
- P. clavifer*, Hk. (Syn. Fil. xlviii, 187). Collected by Sir Hugh Low in Borneo ; no locality given.  
Distribution : New Guinea.



*P. taxodioides*, Baker, Bot. Jour. 1879. p. 42. (210\*) N. Borneo by Burbidge; "An endemic species," Baker in Jour. Linn. Soc. No.

#### § GONIOPHLEBIUM.

*P. (Gonioph) verrucosum*, Wall. (Syn. Fil. xlviii, 252). Common in Sarawak.  
Distribution: Malaya, New Guinea, Philippines, Queensland.

#### § NIPHOBOLUS.

*P. (Niph) adnascens*: Sw. (Syn. Fil. xlviii, 278). Common in Sarawak: often bipinnatifid.  
Distribution: Malaya, Ceylon to N. India; Fiji, Mascaren Islands, Cameroon Mountains.

*P. (Niph) acrostichoides*. Forst. (Syn. Fil. xlviii, 279). At Paku in Upper Sarawak.  
Distribution: Malaya, Ceylon, Philippines, New Hebrides, Queensland.

*P. (Niph) heteractis*, Mett. and Kuhn. Linn. 36. p. 140 (See Syn. Fil. xlviii, 280 in Suppt p. 572). This is the large Himalayan form of *P. (Niph.) Lingua*, Sw. Sempadi River in the Batang Lupar district, Sarawak.  
Distribution: North India and the Malay Isles.

*P. (Niph) nummulariaefolium*, Mett. (Syn. Fil. xlviii, 285). Mt. Matang, Sarawak.  
Distribution: Malaya, N. India, Neilgherries, Philippines.

#### § PHYMATODES, PRESL. (including PLEOPELTIS.)

*P. (Phym) subcostatum*, Hk. (Syn. Fil. xlviii. 297). Paku on the Upper Sarawak River. First found by T. Lobb. His locality is not specified.

*P. (Phym) stenopteris*, Baker, Jour. Bot. 1879, p. 43 (297\*), Found by Burbidge in N. Borneo near the Lawas River) and by me on Bukit Siol near Kuching, Sarawak.

- P. (Phym.) accedens*, Bl. (Syn. Fil. xlviii. 298.) In the Baram District, Sarawak.
- P. (Phym.) oodes*, Kze (Syn. Fil. xlviii. 301.) N. Borneo by Burbidge; the Baram District, Sarawak.  
Distribution: Philippines.
- P. (Phym.) stenophyllum*, Bl. (Syn. Fil. xlviii. 306.) Mt. Matang, and Mt. Lambir and Mt. Mulu, Sarawak.  
Distribution: Malaya, Philippines.
- P. (Phym.) soridens*, Hk. (Syn. Fil. xlviii. 307.) N. Borneo and Mt. Matang, Sarawak.
- P. (Phym.) sinuosum*, Wall. (Syn. Fil. xlviii. 308.) Kuching, Sarawak.  
Distribution: Malaya, Amboyna, New Hebrides, Solomon Isles.
- P. (Phym.) longifolium*, Mett. (Syn. Fil. xlviii. 309.) Common in Sarawak.  
Distribution: Malaya N. India. Philippines.
- P. (Phym.) sarawakense*, Baker. Jour. Linn. Soc. xxii. 2289 (311\*.) Mt. Matang, Sarawak.
- P. (Phym.) angustatum*, Sw. (Syn. Fil. xlviii. 317.) Kuching, Sarawak.  
Distribution: N. India, Malaya, Tahiti.
- P. (Phym.) myriocarpum*, Mett. (Syn. Fil. xlviii. 328.) "Borneo." No locality, or collector. Not seen by me.  
Distribution: Philippines, Cochin-China.
- P. (Phym.) linguæforme*, Mett. (Syn. Fil. xlviii. 329.) Niah in the Baram Residency, Sarawak.  
Distribution: Amboyna, Solomon Islands, Admiralty Islands.
- P. (Phym.) campyloneuroides*, Baker. Jour. Linn. Soc. xxii. 229 (331\*.) Mt. Matang, Sarawak, 2,000 ft. and Niah.

- P. (Phym.) costulatum*, Baker. Jour. Bot. 1880 p. 215. (333\*)  
Mt. Dulit, Sarawak: Mt. Kinabalu by Dr. Haviland,  
= *Acrostichum costulatum* Cesati, Fil. Becc. Polyn. 8.  
Distribution: Sumatra, New Guinea.
- P. (Phym.) leucophorum*, Baker, Jour. Linn. Soc. xxii, p. 229  
(334\*). Mt. Matang, Sarawak 2,500 ft, rare.
- P. (Phym.) rupestre*, Bli. (Syn. Fil. xlviii, 335.) Mt. Matang,  
Sarawak.  
Distribution: Malay Peninsula, Java, Sumatra, Philippines.
- P. (Phym.) platyphyllum*, Sw. (Syn. Fil. xlviii, 337.) Mt. Ma-  
tang; the Baram District, and Mt. Mulu, Sarawak.  
Distribution: Malay Peninsula, Java.
- P. (Phym.) membranaceum*, Don. (Syn. Fil. xlviii, 339.) Island  
of Balabac, off the coast of British North Borneo, by Mr.  
A. H. Everett.  
Distribution: North India to Ceylon; W. China and the  
Philippines.
- P. (Phym.) heterocarpum*, Bl. (Syn. Fil. xlviii, 340). Said there  
to have been found in Borneo. I have not seen it.  
Distribution: N. India, Ceylon, Java, Philippines.
- P. (Phym.) irioides*, Lam. (Syn. Fil. xlviii, 341). Around Kuch-  
ing, Sarawak, common.  
Distribution: N. India to Malaya; Chusan to Fiji; Isle of  
Pines and N. S. Wales; Mascaren Islands, Zambesi Land,  
Natal, Angola, Guinea Coast.
- P. (Phym.) musæfolium*, Bl. (Syn. Fil. xlviii, 342). Samarahan  
River, and Baram District, Sarawak.  
Distribution: Malaya.
- P. (Phym.) Labrusca*, Hooker (Syn. Fil. xlviii, 346). On lime-  
stone hills near the Sarawak River, and in the Baram  
District, Sarawak. First found by T. Lobb.
- P. (Phym.) dulitense*, Baker in Kew Bulletin, Aug. 1893 p. 211  
(346\*). Mt. Dulit, Sarawak.

## DIPTERIS.

- P. (Dipteris) Dipteris*, Bl. (Syn. Fil. xliii, 351) = *Dipteris Horsfieldii*, R. Br. Common in Sarawak from the sea-shore, and river-banks to 2000 ft.  
Distribution : Malaya, Polynesia.
- N. (Dipt.) quinquefurcatum*, Baker, Jour. Linn. Soc. xxiv, 269. (352 \*). A new species which I received from Mr. Forstermann in 1886. He discovered it somewhere inland of Bintulu, Sarawak : it has not been again observed.
- P. (Dipt.) bifurcatum*, Baker (Syn. Fil. xlviii, 353). = *Dipteris Lobbiana*, Hk. Found on the banks of most rivers in Sarawak and North Borneo at some distance above the highest point to which the influence of the tide extends.  
Distribution : Malay Peninsula, Celebes.
- P. (Phym.) incurvatum*, Bl. (Syn. Fil. xlviii, 357). Mt. Matang and the Baram District, Sarawak.  
Distribution : Malaya, Himalayas.
- P. (Phym.) Phymatodes*, L. (Syn. Fil. xlviii, 362.) Common in Sarawak.  
Distribution : Malaya, Ceylon ; Tsus-Sima, Loo Choo, Formosa ; N. Australia ; Mascaren Islands, Natal, Zambesi Land, Angola, Guinea coast.
- P. (Phym.) nigrescens*, Blume, (Syn. Fil. xlviii, 368.) Quop, Mt. Matang, and in the Baram District, Sarawak.  
Distribution : N. and S. India, Ceylon, Malaya, Fiji, Samoa, Friendly Isles.
- P. (Phym.) affine*, Bl. (Syn. Fil. xlviii, 364.) Paku, Upper Sarawak, a limestone district. Sori as yellow as those of *P. aureum* L. Distribution : Malaya, and Philippines.
- P. (Phym.) grandidentatum*, Baker in *New Ferns Ann. Bot.* Vol. v. 1891. (366 \*). It is Cesati's *P. dilatatum* var. *grandidentatum*, Fil. Becc. Born. p. 27. Baker considers it specifically distinct. I have only found it at Banting, Sarawak, where it was discovered by Beccari.

*P. (Phym.) laciniatum*, Bl. (Syn. Fil. xlviii, 367.) Kinabalu at 10,500 ft. by Dr. Haviland.

Distribution : Java, Perak in the Malay Peninsula.

*P. (Phym.) lomarioides* (Syn. Fil. xlviii, 370). This fern Baker now puts in Blume's genus *Lecanopteris* which he has restored. *New Ferns Ann. Bot.* Vol. v, 1891. Dr. Christ in *Die Farnflora von Celebes* p. 161 discusses this change, which he is unable to accept.

*P. (Phym.) ebenipes*, Hk. (Syn. Fil. xlviii, 371.) North Borneo by Burbidge.

Distribution : N. India.

*P. (Phym.) longissimum*, Bl. (Syn. Fil. xlviii, 372.) By the Samarahan River, Sarawak, growing in swampy cleared land.

Distribution : N. India, Neilgherries, Malaya, Philippines, Formosa.

#### DRYNARIA.

*P. (Dryn.) quercifolium*, L. (Syn. Fil. xlviii, 381.) Santubong, on trees along the coast ; Simanggang in the Batang Lupar district, Sarawak. Rare, the next species is the common form.

Distribution : Throughout the Indian region and Ceylon ; Malaya, S. China, Queensland.

*P. (Dryn.) Linnæi*, Bory. (Syn. Fil. xlviii, 382.) Common in Sarawak and N. Borneo.

Distribution : Malaya, Ceylon, Queensland, Solomon Islands and Fiji.

*P. (Dryn.) rigidulum*, Sw. (Syn. Fil. xlviii, 383.) Lundu, Sarawak at about 1,000 ft.

Distribution : Malaya, Queensland, Fiji.

[Dr. Christ in *Die Farnflora von Celebes*, in giving the distribution of *P. (Drynaria) Heracleum*, Kze says "Borneo (Hose)." This is a mistake ; I sent him specimens

of this Fern, [but they were from Perak. So far as I know it has not yet been found in Borneo.]

- P. (Phym.) palmatum*, Bl. (Syn. Fil. xlviii, 384) Sulu Islands; by Burbidge.

Distribution: Malaya, Philippines.

- P. (Phym.) albido-squamatum*, Bl. (Syn. Fil. xlviii, 389.) Sulu Islands by Burbidge.

Distribution: Malay Islands, including New Guinea, and Philippines.

#### TRIBE XII. GRAMMTIDEÆ.

##### MONOGRAMME (Gen. li. Syn. Fil. p. 374.)

- M. dareæcarpa*, Hk. (Syn. Fil. li. 1.) Labuan, Borneo, by Barber. Not seen by me.

- M. trichoidea*, J. Sm. (Syn. Fil. li. 4.) Niah in the Baram District, Sarawak.

Distribution: Malay Peninsula, Philippines.

##### GYMNOGRAMME. (Gen. lii. Syn. Fil. p. 376.)

##### §. *Leptogramme*.

- G. (Lept.) Totta*, Schlecht. (Syn. Fil. lii. 3.) Quop, Sarawak.  
Distribution: Malaya; Ceylon to Himalayas; Corea to Hongkong; Africa and its islands.

##### §. *Stegogramme*.

- G. (Stegn.) aspidioides*, Hk. (non Kaulf.) (Syn. Fil. lii. 13.)  
Niah in the Baram District, Sarawak.  
Distribution: Khasya, Ceylon, Java.

##### §. *Ceropteris*.

- G. (Cerop.) chrysosora*, Baker, Jour. Linn. Soc. xxiv, 260. (51\*)  
See also Baker, *New Ferns*, Ann. Bot. Vol. v. 1891.  
New species, gathered by Mr. Forstermann in the country inland of Bintulu, Sarawak. Mr. Baker in the paper quoted above remarks that this appears to

form a section connecting *Eugymnogramme* with *Ceropteris*, the barren fronds being naked, while the fertile ones are coated with yellow waxy powder.

§ *Syngramme*.

*G. (Syn.) borneensis*, Hk. (Syn. Fil. lii. 58). Sarawak at Banting and on Mt. Matang; in N. Borneo at Sandakan; on the Bongaya River by Mr. Ridley, and elsewhere by Burbidge. First found by Lobb.

——— *Var. major*, Baker, Jour. Bot. 1879, p. 299. Banting, Sarawak.

Distribution: of this variety, Fiji.

*G. (Syn.) cartilagens*, Baker, (Syn. Fil. lii. 59.) Banting, Sarawak, where it was first found by Signor Beccari. In that locality it grows together with *G. borneensis* which is quite typical; and in North Borneo there is a form which is clearly intermediate and I am inclined to doubt whether this ought to be retained as a distinct species.

*G. (Syn.) Lobbiana*, Hk. (Syn. Fil. lii. 61.) Matang, Sarawak. Distribution: Perak, Malay Peninsula.

*G. (Syn.) Wallichii*, Hk. (Syn. Fil. lii. 63.) Kuching, Sarawak, Distribution: Malay Peninsula and Singapore.

*G. (Syn.) alismæfolia*, Hk. (Syn. Fil. lii. 64.) Baram, Sarawak. It is very doubtful whether this should be taken as a species distinct from *G. Wallichii* Hk. Distribution: Malay Peninsula, Singapore, Philippines.

*G. (Syn.) valleculata*, Baker, Jour. Bot. 1888 p. 325 (64\*). A very distinct species. Mt. Lambir, Sarawak.

*G. (Syn.) quinata*, Hk. (Syn. Fil. lii, 65.) Lundu and Gunong Ayer, Sarawak. Distribution: New Guinea, Vanecolla, Solomon Islands.

## § SELLIGUEA.

*G. (Sell.) involuta*, Hook. (Syn. Fil. lii, 69.) Mt. Matang, Sarawak.

Distribution: Malaya, Ceylon to Himalayas, Solomon Islands,

*G. (Sell.) avenia*, Baker, (Syn. Fil. lii, 70.) In the neighbourhood of Kuching, and at Miri in the Baram District, Sarawak.

*G. (Sell.) acuminata*, Baker, Jour. Bot. 1888, 326 (71\*). Lobang on the Samarahan River, and in the Baram District, Sarawak.

*G. (Sell.) campyloneuroides*, Baker, Jour. Linn. Soc. xxiv. 261 (71\*). Mt. Matang, and the Baram District, Sarawak. Distribution: Perak, Malay Peninsula.

*G. (Sell.) regularis*, Baker, (Syn. Fil. lii, 73.) Said there to have been found in Borneo by Korthals; I have not met with it.

*G. (Sell.) macrophylla*, Hooker, (Syn. Fil. lii, 74.) On Mt. Matang, and in the Baram District, Sarawak. Distribution: Malaya to New Guinea and Philippines.

*G. (Sell.) Feei*, Hooker, (Syn. Fil. lii, 76.) Common in Sarawak. There is a form often met with, in which the barren and fertile fronds are alike, both larger than the type. I supposed this to be Blume's *G. vulcanicum*, but it is not recognized as such at Kew. Distribution: Malaya.

## MENISCIUM. (Gen. liv. Syn. Fil. p. 390.)

*M. triphyllum*, Sw. (Syn. Fil. liv, 3.) Mt. Gading, Lundu Sarawak.

Distribution: Malaya, Ceylon to the Himalayas, S. China.

*M. Hosei*, Baker, Jour. Linn. Soc. xxii, 230. (4.\*) On the banks of the rivers Undop, Krian and Saribas, and at Lundu, Sarawak. Near *M. Thwaitesii* Hk.



*M. stenophyllum*, Baker, Jour. Bot. 1891, p. 108. (4\*.) In the Baram District, Sarawak (Mt. Mulu?)

*M. cuspidatum*, Bl. (Syn. Fil. liv. 9.) Banting and Lundu, Sarawak

Distribution: Malaya, N. India, Philippines. Both Syn. Fil. and Col. Beddome raise the question whether this fern and *Pol. (Goniopteris) urophyllum* are not the same. Beddome says they are very much mixed up in all Herbaria. That is likely to be the case, but the great resemblance only begins when both are dried. When living and growing the difference is unmistakeable. It is perhaps most noticeable in the matter of texture; the *Meniscium* is soft, rather thick, and leathery. The *Goniopteris* is crisp, thin, and papery. It is probable enough that both are Nephrodiums with involucres very fugitive, or, more commonly, suppressed.

ANTROPHYUM. (Gen. lv. Syn. Fil. p. 392.)

*A. subfalcatum*, Baker, (Syn. Fil. lv. 2), where it is said to be found in "Borneo." Not seen by me.

Distribution: Fiji, Samoa.

*A. parvulum*, Bl. (Syn. Fil. lv. under 5, *A. plantagineum*, Kaulf.) Mt. Gading, Lundu, Sarawak.

*A. reticulatum*, Kaulf. (Syn. Fil. lv. 7.) Common in Sarawak.

Distribution: Himalayas to Ceylon, Malaya, Aneiteum, Queensland.

*A. semicostatum*, Bl. (Syn. Fil. lv. 8.) Mt. Matang. In the island of Balabac by Mr. A. H. Everett.

Distribution: Malaya, Ceylon Philippines, Polynesia.

*A. latifolium*, Bl. (Syn. Fil. lv. 13.) Found by Beccari on Gunong Wah, Sarawak. Cesati Fil. Becc. Born. p. 80.

Distribution: Java and Bootan.

VITTARIA. (Gen. lvi. Syn. Fil. p. 395.)

*C. elongata*, Sw. (Syn. Fil. lvi. 1.) Common in Sarawak and North Borneo.

Distribution: Malaya, Ceylon, to N. India; Polynesia; Australia; Tropical Africa and its islands.

*V. crassifolia*, Baker, Kew Bulletin, Aug. 1893 p. 212 (1\*) Mt. Dulit, Sarawak 5,000 ft.

*V. pumila*, Mett. (Syn. Fil. lii. 3. p. 51.) Borneo, Wallace.

*V. debilis*, Kuhn. (Syn. Fil. lvi. 3. p. 518.) Sarawak by Lobb; North Borneo by Burbidge.

*V. sulcata*, Kuhn. (Syn. Fil. lvi. 3. p. 518.) Mt. Matang Sarawak: Mt. Kinabalu by Dr. Haviland at 10,500 ft.  
Distribution: Malay Peninsula, Ceylon, New Guinea, Society Islands.

*V. (Taniopsis) lineata*, Sw. (Syn. Fil. lvi. 7.) Mt. Tiang Laju, Batang Lupar district, Sarawak, by Beccari.

*V. (Taniopsis) scolopendrina*, Thwaites (Syn. Fil. lvi. 9.) Common in Sarawak.  
Distribution: Malaya, Ceylon to Himalayas, Philippines, Seychelles, Mozambique.

#### TENITIS. (Gen. lvii. Syn. Fil. p. 096.)

*T. obtusa*, Hooker, (Syn. Fil. lvii. 1.) Borneo by Thomas Lobb. Not seen by me.

*T. blechnoides*, Sw. (Syn. Fil. lvii. 5.) Common in Sarawak and North Borneo.  
Distribution: Malaya, Ceylon, Philippines.

——— *Var. interrupta*, Wall. (Syn. Fil. lvii. 5.) Mt. Matang, Sarawak; North Borneo by Burbidge.

#### DRYMOGLOSSUM. (Gen. lviii. Syn. Fil. p. 397.)

*D. piloselloides*, Presl. (Syn. Fil. lviii. 2.) Common in Sarawak and North Borneo. Both sterile and fertile fronds often forked.  
Distribution: Malaya, Ceylon to Himalayas, and eastward to Fiji.

- D. rigidum*, Hk. (Syn. Fil. lviii. 3.) Borneo, by Thomas Lobb.  
Not seen by me.

HEMIONITIS. (Gen. lix. Syn. Fil. p. 398.)

- H. Hosei*, Baker Jour. Bot. 1891 p. 108 (1\*.) Mt. Matang, Sarawak. I have only found this once, and as far as I know it has not been collected by anyone else. The only other species of this Genus which belongs to this part of the world is *H. lanceolata*. Hooker, which has been found in New Guinea by Beccari.

TRIBE XIII. ACROSTICHÆ.

ACROSTICHUM. (Gen. lx. Syn. Fil. p. 518.)

§ ELAPHOGLOSSUM.

- A. Beccarianum*, Baker ; Beccari, Malesia iii. 27, and Baker, *New Ferns Ann. Bot. Vol. v. 1891* (9\*.) This is the Fern called by Cesati *A. norrisii*, in Fil. Becc. Born. p. 31. Kuching, Sarawak.

§ STENOCHLÆNA.

- A. (Stenoch.) sorbifolium*, L. (Syn. Fil. lx. 66.) Mt. Matang. N. Borneo by Burbidge.

Distribution: Tropical regions all round the world.

A peculiarity of this Fern, not uncommon in Borneo and the Malaya Peninsula, is alluded to by Col. Beddome in *Ferns of British India* p. 423. The lower part of the plant differs curiously from the upper part. For a distance of two or three feet from the ground the rhizome is thin, almost threadlike, and bears short fronds with deeply pinnatifid pinnæ: it then swells out to the normal thickness of  $\frac{1}{4}$  in. or more, and bears sterile and fertile fronds of the usual form and size.

- A. (Stenoch.) scandens*, J. Sm. (Syn. Fil. lx. 68.)

Common in Sarawak and N. Borneo. The young shoots are eaten.

Distribution: Malaya, Ceylon to the Himalayas, S. China, Queensland and Fiji.

§ POLYBOTRYA.

- A. (*Polyb.*) *stenosemiodes*, Baker, Jour. Linn. Soc. xxii. 230 (71.\*)  
Mt. Matang, Sarawak at 1,000 ft.

§ EGENOLFIA.

- A. (*Egen.*) *appendiculatum*, Wild. (Syn. Fil. lvi 84.) The Island of Balabac by Mr. A. H. Everett.  
Distribution: Malaya, throughout the Indian region, Philippines and Hongkong.

§ STENOSEMIA.

- A. (*Stenos.*) *auritum*, Sw. (Syn. Fil. lxi. 91.) Mt. Matang;  
and Niah in the Baram District, Sarawak.  
Distribution: Malaya, Philippines and Solomon Islands.

§ GYMNOPTERIS.

- A. (*Gymn.*) *oligodictyon*, Baker, Jour. Linn. Soc. xxiv. p. 261  
(93\*.) Niah in the Baram District, Sarawak. Near the  
last species.
- A. (*Gymn.*) *quercifolium*, Retz. (Syn. Fil. lx. 97.) Kudat, N.  
Borneo.  
Distribution: Ceylon and Peninsula India, S. China, Co-  
chin China.
- A. (*Gymn.*) *flagelliferum*, Wall. (Syn. Fil. lx. 100.) Niah in  
the Baram District, Sarawak; Island of Balabac by Mr.  
A. H. Everett.  
Distribution: Malaya, N. India, Burmah, Philippines,  
Solomon Islands.
- A. (*Gymn.*) *subrepandum*, Hk. (Syn. Fil. lx. 103.) Mt. Gading,  
Lundu, Sarawak.  
Distribution: Singapore, Penang, Philippines.
- A (*Gymn.*) *exsculptum*, Baker. Jour. Bot. 1888 p. 326 (107\*.)

Niah in the Baram District, Sarawak.

§ CHRYSODIUM.

A. (*Chrys.*) *modestum*, Baker, Jour. Linn. Soc. xxii. p. 231 (108\*.)  
Banks of the Kabo, a branch of the Krian River, Sarawak.

A. (*Chrys.*) *antrophyoides*, Baker, Jour. Linn. Soc. xxii. p. 231.  
(110\*.) Mt. Matang, Sarawak.

A. (*Chrys.*) *bicuspe*, Hk. (Syn. Fil. lx. 115.) Mt. Lingga, and  
Mt. Dulit, Sarawak.  
Distribution: Malaya, Formosa, Loochoo Islands.

——— Var. *integrifolium*, Eaton. I found this on Mt. Lingga  
growing along with the normal form. I doubt if it is a  
true variety.

A. (*Chrys.*) *Blumeanum*, Hk. (Syn. Fil. lx. 122)? On Mt. Ma-  
tang I have twice met with a plant entirely correspond-  
ing to this Fern as found in Perak, but bearing sterile  
fronds only.

A. (*Chrys.*) *aureum*, L. (Syn. Fil. lx. 127.) Common.  
Distribution: Near the sea in the warm regions all round  
the world.

§ HYMENOLEPIS.

A. (*Hymeno.*) *spicatum*, L. (Syn. Fil. lx. 129.) Common.  
Distribution: Malaya; N. and S. India and Ceylon;  
Queensland, Society Islands.

§ PHOTINOPTERIS.

A. (*Photin.*) *rigidum*, Wall. (Syn. Fil. lx. 131.) Banting; and  
on the Sarawak and Undop Rivers, Sarawak.  
Distribution: Malaya and Philippines.

A. (*Photin.*) *drynarioides*, Hooker, (Syn. Fil. lx. 132.) In North  
Borneo by Burbidge.  
Distribution: Pewang, and Perak in the Malay Peninsula.

## PLATYCERIUM, (Gen. lxi. Syn. Fil. p. 425.)

*P. grande*, J. Sm. (or A. Cunn.?) (Syn. Fil. lxi. 3.) North Borneo by Burbidge.

Distribution: Singapore, Philippines, N. Australia.

*P. biforme*, Bl. (Syn. Fil. lxi. 5.) Common in Sarawak and N. Borneo.

Distribution: Malaya and Philippines.

## Subord. iii. OSMUNDACEÆ.

## OSMUNDA. (Gen. lxii. Syn. Fil.)

*O. javanica*, Bl. (Syn. Fil. lxii. 1.) In the Sulu Archipelago by Burbidge.

Distribution: Kamschatka to Java.

## SUBORDER IV. STHIZÆACEÆ.

*Schizæa* (Gen. lxiv. Syn. Fil.)

*S. malaccana*, Baker (Syn. Fil. lxiv, 3.) Mt. Matang 3,000 ft, Sarawak, and in North Borneo by Burbidge.

Distribution: Malaya, Philippines.

§ *Lophidium*.

*S. (Loph.) dichotoma*, Sw. (Syn. Fil. lxiv, 13.) Not uncommon in Sarawak, near the Undop River, in the Quop district and elsewhere; North Borneo by Burbidge.

Distribution: Malaya, South India, Philippines; Australia, Polynesia; Mascaren Islands, Tropical America and West Indies.

§ *Actinostachys*.

*S. (Actin.) digitata*. Sw. (Syn. Fil. lxiv. 16.) Near the Undop River, Sarawak.

Distribution: Malaya, Ceylon to Himalayas, Philippines, Fiji.

## LYGODIUM (Gen. lxviii. Syn. Fil. p. 436.)

*L. dichotomum*, Sw. (Syn. Fil. lxviii. 2.) Common everywhere.

Distribution : Malaya, Ceylon to North India, Philippines, Chusan, Hongkong.

*L. scandens*, Sw. (Syn. Fil. lxxviii. 7) Common everywhere.

Distribution : Malaya, Ceylon to Himalayas, South China, Queensland ; Guinea Coast.

#### SUBORDER V. MARATTIACEÆ.

ANGIOPTERIS. (Gen. lxxix. Syn. Fil. p. 440.)

*A. evecta*. Hoffm. (Syn. Fil. lxxix. 1) Santubong, Lingga, Sebetan River, and the Baram District, Sarawak.

Distribution : Malaya, Ceylon to Himalayas, Madagascar, New Caledonia, Queensland, Society Islands.

KAULFUSSIA, (Gen. lxxii. Syn. Fil. p. 444.)

*K. æsculifolia*, Bl. (Syn. Fil. lxxii. 1.) Mt. Matang at 2500 ft.

Distribution : Malay Peninsula and Islands, N. India, Philippines.

#### SUBORDER VI. OPHIOGLOSSACEÆ.

OPHIOGLOSSUM, (Gen. lxxiii. Syn. Fil. p. 444.)

*O. reticulatum*, L. (Syn. Fil. lxxiii. 6.) This I have found once only at Kuching, Sarawak. I sent the specimen gathered to Kew, and have not met with it again. = *O. Cumingianum*, Presl.

#### § OPHIODERMA.

*O. (Ophiod.) intermedium*, Hk. (Syn. Fil. lxxiii. 7.) Borneo, by Lobb.

*O. (Ophiod.) pendulum*, L. (Syn. Fil. lxxiii. 8.) Kuching, Sarawak. Distribution : Malaya, Ceylon to Assam, Philippines, N. Australia, Polynesia, Mascaren Islands.

HELMINTHOSTACHYS, (Gen. lxxiv. Syn. Fil. p. 447.)

*H. zeylanica*, Hk. (Syn. Fil. lxxiv. 1.) Saribas River, Sarawak. Distribution : Malaya, Ceylon to Himalayas, Philippines, New Caledonia, and Queensland.

*G. F. Singapore and Sarawak.*

## THE SCITAMINEÆ OF THE MALAY PENINSULA.

The traveller in the forests of the Peninsula can hardly fail to notice the beauty of many of our wild gingers (*Scitamineæ*) and would be surprised to find how much this interesting group of plants has been neglected by botanists, for though many have received names, but few have been completely described, and the descriptions of Malayan species by Miquel and Blume are often so incomplete that it is impossible to make out what plants they are intended for. Many descriptions have been made from badly dried specimens, and unless special care is taken these plants do not preserve well, for the flowers are thin and fugacious, and the spikes usually full of water, and unless the flowers are dried separately from the spikes they are apt to rot in the press. Very few kinds again have been cultivated in gardens either in the East or in Europe, but those that have, have often been well figured and described. In studying this group here, I have in nearly every case compiled the description from specimens in the jungle itself, or from plants brought home and cultivated in the Botanic Gardens.

The Order consists of five groups, which, beginning with the most specialised, are *Zingiberaceæ*, *Marantaceæ*, *Cannaceæ*, *Lowiaceæ* and *Musaceæ*.

The typical monocotyledonous flower consists of three sepals (calyx) three petals (corolla) six stamens in two whorls and three pistils. In this order the sepals are usually united into a tube and the corolla also forms a tube, with the petals free at the top (corolla lobes.) The stamens in the *Musaceæ* (Bananas) and *Lowiaceæ* are five in number, one being entirely suppressed, or forming part of the lip. In the Arrow-roots, (*Marantaceæ*) only four are developed, one forms the lip, another is spatulate and hooded (the cucullate stamen) a third is flat and resembles a petal (petaloid) and the other is narrow and bears in its edge an anther cell. This curious arrangement is



an elaborate contrivance for insect fertilization which cannot easily be explained without diagrams. In the Cannas (*Cannaceæ*) four of the stamens are petaloid and the fifth bears an anther cell on its edge. These plants are self-fertilized in bud. No Cannas are really wild here but one or two have escaped from cultivation. The *Zingiberaceæ* have a single complete stamen only, the rest being either entirely suppressed except one which forms the lip, or two more may appear as petal-like lobes or horns or teeth, (Staminodes). The ovary is three-celled in most of the order, but bears only one style, which is however three-lobed in *Lowiaceæ*, showing its origin from three styles. In all the *Zingiberaceæ* but one or two genera, there are at the base of the corolla tube, two small processes, the stylodes, which are probably the remains of the other styles, or possibly some of the lost stamens. Their function is apparently to secrete nectar which fills the bottom of the tube. The flowers of nearly all are fertilized by bees, or sometimes flies. The spikes, racemes or panicles are borne on leafy stems or spring directly from the rhizome, the leaves being borne on different stems. As a rule plants growing in dense jungle have the flowers close to the ground on short leafless stems, while those which grow on river banks or open spaces have them on the ends of leafy stems. The fruits of the different groups do not differ much, except in the case of the Musas, which have the well known Banana fruit, the rest have capsules of two or more seeds (in *Donax* there is often but one seed). The seeds are usually enclosed in a sweet aril, and in the *Zingiberaceæ* are usually very aromatic. The fruits are seldom conspicuous, and often only dull green in color. This is especially the case with those which fruit near the ground, the seeds of which are distributed by mice and squirrels who eat the sweet pulp (aril) surrounding the seed. The fruits of some of the terminal spiked species, *e.g.* *Alpinia*, are orange and showy, and the seeds dispersed by birds.

USES. The *Zingiberaceæ* are nearly all very aromatic, and many have very strongly flavoured root-stocks, which are used as spices. Among these the Ginger, Turmeric, and Zedoary, and Galangal are commonly cultivated here, and many of the wild Globbas, and Amomums are used in native medicine. The

fruits of a few species of *Amomum*, e. g. *A. uliginosum*, are eaten also by Sakais. The buds of *Hornstedtia imperialis* are also popular as curry-stuffs among the Malays, and the fruit of the commonest of our wild plantains, *Musa Malaccensis* is quite eatable, though it is small and full of seed. Indeed I believe that this plant is the parent of several of the local cultivated Pisangs. The wild plantains also give a very good fibre from the leaf sheaths, though it is not by any means as good as that of the Manilla hemp (*Musa textilis*). The stout stems of the Bemban (*Clinogyne*) split up, are used for making baskets, and I found that the leaf stems of the bigger Gingers, (*Hornstedtia*), beaten up and treated with caustic potash, formed a very good paper stuff, and might be used for that purpose, if there was sufficient demand for it.

## GROUPS.

Fertile stamen one : with two cells. Aromatic. *Zingiberaceæ*.

„ with one cell. Not aromatic. *Marantaceæ*.

Fertile stamens 5. Calyx lobes long, lip large, small plants *Lowiaceæ*.

„ Calyx, and corolla sheath-like, lip small, very large plants *Musaceæ*.

## SYNOPSIS OF ZINGIBERACEÆ.

Staminodes broad and petaloid, Spike or panicle terminal.

1. *Globba*. Stamen much longer than the corolla, slender. Lip adnate to it above the corolla.

2. *Hedychium*. Stamen long and slender. Lip not adnate above the corolla.

3. *Camptandra*. Stamen short, anther dorsifixed versatile. Staminodes much broader than corolla, flat.

4. *Kæmpferia*. Anther cells on a broad thin connective. Staminodes much broader than corolla, flat.

5. *Gastrochilus*. Staminodes not broader than corolla lobes. Anther thick terminal. Spike terminal or radical cylindric.

6. *Curcuma*. Staminodes not broader than corolla lobes. Flowers in a cone-like spike radical.

7. *Conamomum*. Staminodes smaller than corolla lobes, anther with long curved arms. Spikes radical.

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Staminodes small absent, or adnate to lip.

8 *Costus*. Spikes terminal or radical. Stamen with a thin petaloid filament.

Spikes dense with large persistent bracts. Filament thick.

9. *Zingiber*. Anther with a long curved beak, Lip three-lobed.

10. *Amomum*. Anther with two curved arms, Lip broad,

11. *Hornstedtia*. Anther with no arms, crest small or none, Lip narrow.

12. *Plagiostachys*. Spike lateral from the leafy stem.

13. *Elettariopsis*. Panicle lax creeping from the rhizome.

14. *Geostachys*. Panicle compact erect or pendulous from the rhizome.

15. *Alpinia*. Panicle terminal on a leafy stem.

### GLOBBA.

This pretty genus is very distinct from all except the Indian *Mantisia*, in the peculiar form of the flowers, which are borne on a long slender panicle with short branches. The calyx is tubular or cup-shaped, the corolla tube usually slender and longer with small boat-shaped lobes reflexed when the flower is open, and a pair of staminodes very similar to the corolla lobes. The lip base is parallel to the erect stamen and its sides joined to it, forming a tube, the limb or free portion is narrow and usually bilobed. The tube contains nectar, and the entrance to it is a slit in front, at the foot of which is usually a brown or violet spot, a guiding mark for the insect visitors. The stamen above the lip is long and slender, and curved over at the top where it bears the oblong anther, which often has one or two pairs of processes at the sides usually flat and linear or triangular (the spurs). The style is long and slender and runs up along the stamen, passing between the anther cells in the usual way. The fruit is a small capsule as big as a pea, which when ripe splits widely open exposing a number of small brown seeds. The flowers are either yellow, or white or violet, and in some cases the bracts are coloured red or yellow, making the plants very showy. Globbas are to be found in all of

our forests on rocks, or in damp spots, often in great abundance. The genus occurs in the Himalayas and Burma, less commonly in other parts of India, and, except for one possibly introduced species, is absent from Ceylon. They are abundant all over the Malay Peninsula and Siam, Sumatra and Borneo, becoming rarer further east.

The species, though somewhat variable, are tolerably easily distinguished and classified, though it is not always easy to identify some of those that have been described on account of the authors having often omitted to describe important parts of the flower. Thus Miquel rarely described the anther-spurs, the best character for classifying the species, while Baker in the Flora of British India while paying due attention to this character lays some stress on the presence or absence of bulbils, which are often produced from the axils of the bracts. This character however is absolutely worthless. Any globba growing in a sufficiently wet spot especially near a stream will produce bulbils sometimes completely replacing the flowers with them. In two species *G. marantina* and *G. bulbilifera* it is true that bulbils are invariably produced in the lower bracts, but all the species may at times bear them also. An important character also is the calyx, and as specimens are often met with in which the corolla is fallen away, this organ which remains on the fruit is very useful in identification. Sometimes it is regular and tubular with three equal points, sometimes dilated upwards or again curved with two large and one small tooth or there may be no trace of teeth or lobes.

Those who have not seen globbas in plenty growing wild might be puzzled by odd forms which sometimes occur in which the inflorescence is borne on leafless stems. Miquel's *G. aphylla* is probably one of these, perhaps a sport of the very common *G. panicoides*. Plants also with branching stems occur, but are much rarer.

#### § APLANTHERA.

**Anthers spurless, Flowers yellow.**

*G. Wallichii* Baker. Flor. Brit. Ind. p. 202.

About 2 feet tall, the lower sheathing leaves dotted with purple pubescent or hispid. Leaves lanceolate acuminate rather

thin in texture about 5 inches long by  $1\frac{1}{2}$  inch wide, upper ones smaller, finely pubescent on both sides, sheaths long about 3 inches hispid, ligule rounded hispid. Panicle long and slender branches distant one inch long. Flowers crowded at the ends few orange. Bracts lanceolate very small. Calyx campanulate with two other long acute lobes and one shorter,  $\frac{1}{8}$  inch long. Corolla tube  $\frac{1}{4}$  inch long, lobes rather short  $\frac{1}{8}$  inch long ovate. Staminodes longer  $\frac{1}{4}$  inch long, linear oblong. Lip short linear entire with a brown central spot. Stamen filament  $\frac{1}{2}$  an inch long, anther  $\frac{1}{8}$  with no margin nor spurs. Capsule globose smooth.

Penang. Banks on Moniot's Road.

*G. floribunda*. Baker, p. 203.

Plant 2 feet tall, with oblong leaves nearly a foot long, pubescent, a long lax panicle with many branches 1 to  $1\frac{1}{4}$  inch long, rachis very hairy. Bracts small and deciduous. Corolla pale yellow, lobes oblong, lip long not bifid, anther with a narrow border.

Johore. (King.)

I have never seen this either wild or in Dr. King's collections.

*G. uliginosa*. Miq., Fl. ind. Bat. Suppl. p. 613. Baker. l c. p. 203.

Habit exactly that of *G. panicoides* Miq. Stems tufted 2 feet long, lower sheaths spotted with red. Leaves lanceolate acuminate three inches wide, glabrous above except for some rather long strigose hairs along the nerves, pubescent beneath sheaths hispid. Panicle long and lax with short scattered branches  $\frac{1}{4}$  inch long with 2 or 3 flowers on each. Bracts oblong obtuse green. Calyx funnel-shaped with rather long acute lobes  $\frac{1}{8}$  inch long. Corolla tube slender  $\frac{1}{4}$  inch long, lobes ovate oblong, upper one boat shaped  $\frac{1}{2}$  an inch long orange. Staminodes oblong obtuse. Lip very narrow and short bilobed, lobes linear obtuse orange with a black central spot. Filament slender  $\frac{1}{4}$  inch long, anther cells narrow elliptic diverging at base with no margin or processes.

Singapore. Bukit Mandai; Malacca. Alor Gajah.

Perak. Thaiping hills; Gopeng (King). Penang (King) in Fl. Brit. Ind.

This plant is very near *G. panicoides* Miq., differing in the absence of spurs to the anther, and the form of the calyx. It is possible that it is only an abnormal form. The Singapore plant produced leafless or almost leafless stems bearing panicles.

### § CERATANTHERA.

**Anther 2-spurred. Flower yellow.**

*Gl. panicoides*. Miquel. l.c. 614.

*Gl. Kingii*. Baker. l.c. 204. *G. stenothyrsa* Bak. l.c.

Stems tufted, from nine inches to two feet in height usually rather slender, sheaths at the base spotted with red, more or less pubescent. Leaves narrow lanceolate acuminate to ovate acuminate  $1\frac{3}{4}$  inch to 5 inches long and  $\frac{3}{4}$  to one and a half inch broad, ligule hispid. Panicle slender, the branches usually short sometimes rather long spreading. Flowers usually few. Bracts lanceolate green. Calyx short unequally 3 toothed, one tooth much longer than the others, lanceolate blunt, orange  $\frac{1}{8}$  inch long. Corolla tube  $\frac{1}{2}$  inch long, lobes cymbiform  $\frac{1}{4}$  inch long orange. Staminalodes rather longer oblong, orange. Lip short oblong bilobed orange with a dark brown central spot. Stamen filament one inch long, anther cells parallel, connective developed all round and at the base prolonged into a pair of subulate spurs. Style longer than the stamen, stigma very small. Capsule globose smooth rounded green  $\frac{1}{4}$  inch long terminated by the enlarged calyx.

Singapore, Bukit Timah and other woods; Muar (Feilding). Malacca, Sungei Hudang; Merlimau. Selangor, Kwala Lumpur, Batang Berjuntai, Petaling. Sungei Ujong; Bukit Tumiang. Perak. Bruas. Dindings. Province Wellesley, Tasek Gelugur. Lankawi, (Curtis 2642) also Lingga island (Hullett). Sumatra on the Kelantan river, Siak. Borneo, Sandakan, Bongaya river, Labuk bay and Sarawak.

This is a very common plant along stream banks and in damp spots in woods all over the Malay Peninsula. It is very variable in size, form of leaf, and length of panicle and its branches. The forms from Sarawak and Sandakan are stout broad leaved forms with branches an inch and a half long, and

longer calyces, but I can only consider them as extreme forms.

I have the authority of Dr. King for identifying *G. Kingii* Baker with the ill-described *G. panicoides* of Miquel of which he has seen a type. It would indeed be strange if so very abundant and conspicuous a plant had escaped Miquel. I cannot from the description distinguish *G. stenothyrsa* Baker. from this plant. It is based on specimens from Tenasserim collected by Parish, and from a plant collected by Cuming in Malacca.

Like all other Globbas, this often produces bulbils in the axils of the bracts, and often the whole panicle produces bulbils instead of flowers.

It is known to the Malays by a variety of names, viz. Haliya lutan (wild ginger), Meroyan Tingal, and Meroyan B'rehoin, Pua Birah, Bunga Lidah Munta, Haliya K'ra. The slightly aromatic roots are used in native medicine for fever, and rheumatism.

*Gl. pendula* Roxb. Asiat. Res. XI. 359 Fl. Ind. 179.

A large plant 3 feet or more tall. Leaves oblong cuspidate 9 inches long, 4 across glabrous, ligule rounded pubescent, sheaths with pubescent edges. Panicle stout sometimes nearly 2 feet long, branches short few-flowered. Bracts lanceolate caducous. Calyx funnel-shaped  $\frac{1}{4}$  inch long, with 3 unequal acute lobes. Corolla tube slender half an inch long, lobes cymbiform  $\frac{1}{4}$  inch long orange yellow.

Staminodes thin oblanceolate obtuse as long. Lip adnate from a little above the staminodes narrow bilobed orange with a maroon central spot nearly  $\frac{1}{2}$  an inch long. Stamen filament over  $\frac{1}{2}$  an inch long; anther elliptic horns linear subulate 2 about as long as the anther, connective prolonged above the anther into a rounded process.

Penang. Banks close to the Waterfall. Perak on Maxwell's hill. Kedah Peak by the Cascade. Pahang, Tahan river. One of the biggest species. The name *pendula* is by no means a good one, as the stout panicle is usually stiffly erect.

*Gl. montana* n.sp.

Stems about 2 feet tall. Leaves lanceolate cuspidate thin 7 inches long  $1\frac{1}{2}$  inch broad, with a long attenuate point, glabrous above paler pubescent beneath, petiole short but usually distinct,

ligule rounded pubescent, sheaths very hairy. Panicle long slender 1 to  $1\frac{1}{2}$  foot long, branches 1 to 2 inches long, horizontal rather distant few flowered. Bracts ovate oblong  $\frac{1}{8}$  inch long. Calyx campanulate lobes acute,  $\frac{1}{8}$  inch long. Corolla tube slender  $\frac{1}{2}$  inch long, lobes broadly ovate obtuse  $\frac{1}{4}$  inch long, yellow. Staminodes absent. Lip small free for some distance above the corolla lobes apex rounded almost entire. Stamen, filament above the lip  $\frac{1}{2}$  an inch long, anther small elliptic with large flat triangular wings running the whole length but shorter than the anther.

Kedah Peak, and near the waterfall.

This is a stout plant like *G. pendula* Roxb, but is remarkable in the anther spurs, which form a triangle in the centre of which are the anther cells. The staminodes seem to be entirely wanting.

*Gl. calophylla* n.sp.

Stems over a foot tall fairly stout, lower sheaths spotted red. Leaves oblong lanceolate acuminate with a long point 6 inches long  $1\frac{3}{4}$  inch broad, deep green above with silvery central and lateral bars, glaucous tinted with red beneath, base narrowed into a petiole, glabrous above pubescent especially along the midrib beneath. Panicle 6 inches long branches spreading distant an inch long, many flowered. Bracts broadly oblong ovate  $1\frac{1}{6}$  inch long persistent for some time. Calyx tubular campanulate dilated upward  $\frac{1}{8}$  inch long with short lobes. Corolla tube very slender  $\frac{1}{4}$  inch long, lobes boat-shaped broad blunt yellow. Staminodes oblong half as long again as the lobes. Lip short linear apex bifid lobes rounded, orange with no spot. Filament very slender  $\frac{3}{4}$  inch long, anther spurs 2 broad triangular, as broad as the anther at the base. Bulbils sometimes produced.

Siam near Pungah (Curtis No. 3286.)

This pretty plant is noticeable from its ornamentally colored leaves and botanically it is remarkable for its dilated calyx and its unusually large staminodes and very short narrow lip.

*Gl. malaccensis* n.sp.

Stems 2 feet tall or longer. Leaves broadly lanceolate acuminate rather distant six inches long, 2 across, glabrous,



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ligule short rounded pubescent, sheath pubescent, petiole distinct sometimes half an inch long. Panicle short compact on a long peduncle nude except for a few distant bracts, the lowest of which are nearly 2 inches long linear green; branches short about  $\frac{1}{4}$  inch long few flowered. Calyx cylindric with short acute lobes nearly  $\frac{1}{4}$  inch long. Corolla tube very slender  $\frac{1}{2}$  an inch long, lobes ovate boat-shaped less than  $\frac{1}{4}$  inch long yellow. Stamines oblong obtuse about as long. Lip short linear oblong entire. Anther oblong with two triangular subulate spurs from the centre of the side, filament  $\frac{3}{4}$  inch long. Capsule globose wrinkled  $\frac{1}{4}$  inch long.

Malacca. Woods at the base of Mt. Ophir: Bukit Sedanen. Selangor, Bukit Hitam (Kelsall). Sungei Ujong, Bukit Sulu; Bukit Kandong.

This is called by the Malays, Pua Rimbah, Pua Hudang and Pua Gajah, and is used medicinally in childbirth.

It has the habit of *G. aurantiaca* Miq, but is very much less hairy and has only two spurs on the anther, and the long peduncle with a terminal dense panicle and narrow persistent bracts distinguish it from all others.

*Gl. integra* n.sp.

Stem 3 to 4 feet tall. Leaves oblong lanceolate cuspidate subpetiolate about a foot long and three inches across, the point nearly 2 inches long, glabrous above minutely pubescent beneath, ligule rounded and pubescent. Panicle about a foot long rather weak, branches  $\frac{1}{2}$  an inch long or less, patent numerous with two or three flowers at the end. Bracts oblong ovate  $\frac{1}{8}$  inch long. Calyx small campanulate  $\frac{1}{8}$  inch long, lobes ovate obtuse. Corolla tube about twice as long, lobes boat-shaped obtuse  $\frac{1}{4}$  inch long orange. Stamines much smaller oblong. Lip narrow linear obtuse entire. Filament short, anther oblong with a broad triangular wing on each side.

Siam, Bangtaphan, common along Ba Quean stream. (Dr. Keith.)

This species is remarkable for its short flowers, narrow entire lip and broad triangular anther-spurs.

*Gl. Keithii* n. sp.

Leaves narrowly lanceolate cuspidate six inches long about

$\frac{1}{2}$  an inch broad, glabrous, ligule absent. Panicle over six inches long with numerous branches 2 inches long or less with a few flowers at the apex. Bracts linear lanceolate persistent  $\frac{1}{2}$  an inch long. Calyx slender tubular  $\frac{1}{4}$  inch long lobes lanceolate. Corolla tube very long and slender  $\frac{3}{4}$  inch long grey, lobes obtuse boat-shaped less than  $\frac{1}{4}$  inch long yellow. Stamínodes lanceolate oblong yellow. Lip long and narrow deeply bilobed lobes rounded. Filament very slender  $\frac{1}{2}$  an inch long, anther elliptic grey with a lanceolate acuminate spur on each side in the upper part of the anther.

Siam. Bangtaphan in Bamboo-jungle. (Dr. Keith.)

The very narrow leaves, and long corolla tube, and the curious anther spurs easily distinguish this plant.

Flowers white or violet.

*Gl. leucantha* Miq. l. c. 612.

*Gl. pallidiflora* Bak. l. c. 204.

Rhizome short, roots with tuberous fusiform swellings. Stems about two feet tall, often less. Leaves broadly lanceolate acute, 8 inches long and 3 across, very finely pubescent especially on the under surface, dark green above, purple beneath, sheaths striate hispid usually spotted with purple, ligule short hardly  $\frac{1}{8}$  inch long, rounded hispid. Panicle terminal rarely radical, lax, with spreading branches two inches long. Bracts ovate  $\frac{3}{8}$  inch long. Flowers in threes on the branches, ivory white. Bracts ovate pure white. Calyx tubular with three teeth, two longer than the third,  $\frac{1}{4}$  inch long white shining, minutely pubescent. Corolla tube slender about  $\frac{1}{2}$  an inch long, lobes cymbiform  $\frac{1}{4}$  inch long. Stamínodes narrower oblong a little longer. Lip short oblong rounded shortly bilobed, white with a purplish brown spot, (sometimes absent). Stamen nearly one inch long (above the corolla) anther cordate with two slender subulate horns a little longer than it, cells yellowish. Style slender longer than the anther, ovary white pubescent. Stylodes cylindrical acute. Capsule globose  $\frac{3}{16}$  inch long polished smooth bright green. Seeds about 8, angled  $\frac{1}{8}$  inch long.

Singapore, common on Bukit Timah, Chan Chu Kang, etc. Pulau Damar, Johore, Tanah Runto; Gunong Pulai; Gunong Pantí (King). Perak, Dindings at Lumut.

A very pretty species, the whole of the inflorescence being pure white and much of it polished like ivory. It frequents rather dry parts of woods - often growing on rocks. Forms occur in which the leaves on some of the flowering stems are suppressed, the stems being merely covered with sheaths. In one plant the stem bore axillary panicles as well as the terminal one. Bulbils are often to be met with on the lower branches of the panicle but more rarely than in other species.

*Gl. albiflora* n. sp.

Stems three feet tall. Leaves narrowly lanceolate acuminate cuspidate eight inches long, one inch broad, glabrous green with a silvery grey variegation along the midrib when young, ligule very short, sheath glabrous. Panicle 12-15 inches long with distant slender branches spreading, one inch long or less. Bracts persistent linear obtuse nearly  $\frac{1}{4}$  inch long. Flowers white, one or two only on the ends of the branches. Calyx tubular with short lanceolate lobes. Corolla tube very slender  $\frac{1}{2}$  an inch long, lobes boat-shaped ovate. Staminodes longer oblong linear. Lip short obconate bilobed, lobes rather long divergent. Filament  $\frac{3}{4}$  inch long anther oblong, spurs 2 linear acuminate falcate, longer than the anther.

Penang: Government Hill near the cooly lines (Curtis 2851). A rather slender, narrow leaved plant, remarkable for its long persistent bracts, and long upcurved spurs of the anther.

*Gl. elegans* n. sp.

Stems over a foot tall rather slender. Leaves lanceolate acuminate minutely pubescent beneath, 5 inches long,  $1\frac{1}{4}$  inch wide, ligule and margin of sheath hispid. Panicle erect rather slender with short stiff spreading branches half an inch long. Bracts lanceolate green persistent  $\frac{1}{8}$  inch long. Flowers few crowded at the ends of the branches, white. Calyx unequally 3 lobed, lobes acute,  $\frac{1}{4}$  inch long, Corolla tube nearly  $\frac{1}{3}$  an inch long, lobes, oblong ovate obtuse  $\frac{3}{16}$  inch long. Staminodes very similar and as long, Lip short oblong ovate obtuse entire white with a violet central spot. Filament  $\frac{1}{2}$  an inch long, spurs of anther linear curved up at the ends  $\frac{3}{16}$  inch long, Capsule globose smooth  $\frac{1}{4}$  inch long

Dindings, Woods near Bruas, and Gunong Tungul. (No 8392). This resembles *G. leucantha* Miq, but has smaller nearly glabrous leaves, straight and slender panicle and an entire lip. *Gl. violacea* n. sp.

Stems one to two feet tall rather stout. Leaves large or moderate oblong lanceolate acuminate with a long point, covered with scattered strigose hairs on both surfaces, or sometimes only scabrid, 7 to 10 inches long, 2 inches broad, dark green above paler beneath, ligule short rounded very hairy, sheaths with stiff hairs. Panicle of numerous short branches about half an inch long stiff and horizontal. Bracts small ovate lanceolate white. Calyx cylindric with three short points, one shorter than the others, as long as the corolla tube, ivory white. Corolla tube  $\frac{1}{4}$  inch long, lobes ovate boat-shaped violet or white. Stamines longer and narrower violet,  $\frac{1}{4}$  inch long. Lip very narrow linear grooved nearly the whole way down bilobed, violet or white with a darker spot near the apex, apex yellowish. Stamen long rather stout, anther oblong rather large violet, with two long linear spurs. Capsule smooth globose white dehiscing entirely and exposing a number of ovoid beaked brown seeds.

Johore: Gunong Pulau. Selangor, Bukit Hitam (Kelsall). Perak, Bujong Malacca; Gunong Keledang. Ipoh (Curtis 3316) Gunong Inas (Wray 4164). Dindings.

This is very nearly allied to *G. leucantha*, but the corolla tube is much shorter, and the lip very much narrower. The flowers are sometimes entirely ivory white, at others violet.

#### § MARANTELLA.

**Anther 4 spurred. Flowers yellow.**

*Gl. aurantiaca* Miq. l. c. 613.

Rhizome short. Stems about 18 inches tall, the bases covered with hairy sheaths. Leaves oblong to ovate cuspidate 7 inches long and 3 wide (often much smaller) hairy beneath, sheaths hairy. Peduncle 18 inches or less, hairy. Panicle compact usually short sometimes as much as 8 inches long, branches short  $\frac{1}{4}$  inch long, numerous horizontal, with a few empty bracts at the base and two or more flowers. Bracts orange, oblong obtuse hispid  $\frac{1}{8}$  inch long, lower ones sometimes

bulbilliferous. Pedicels  $\frac{1}{4}$  inch long, pubescent. Calyx funnel-shaped  $\frac{1}{4}$  inch long 3 toothed, teeth short and blunt pubescent. Corolla yellow, tube nearly  $\frac{1}{2}$  an inch long lobes rather large oblong. Lip short broad oblong bilobed orange with a brown central blotch. Staminodes short oblong. Stamen filament slender  $\frac{1}{4}$  inch long, anther oblong with two pairs of triangular teeth. Fruit globose smooth crowned with the long tubular calyx.

Malacca, Brisu (Derry, No 18). Selangor, common, Bukit Hitam; Bukit Kudah. Negri Sembilan, Gunong Berumbun. Perak, Larut Hills. Penang, Moniot's road. This plant, the "Pua Gumbur" of the Malays, is easily recognised by its hairy stem, broad hairy leaves and crowded panicle.

*Gl. perakensis* n. sp.

Stem stout about a foot or a foot and a half tall. Leaves obovate cuspidate broad, narrowed at the base glabrous, 8 inches long by 4 wide, petiole  $\frac{1}{4}$  inch hispid, ligule short oblong rounded. Peduncle 8 inches long with large ovate orange bracts, the lowest an inch long, upper ones smaller oblong obtuse, softly pubescent, edges ciliate. Panicle short an inch long dense, branches about half an inch long pubescent. Bracts short and broad ovate orange. Calyx short tubular  $\frac{1}{2}$  inch long pubescent, orange. Corolla tube twice as long, lobes ovate. Lip short broad oblong bilobed orange with a brown central spot. Staminodes oblong linear obtuse pale orange. Stamen connective of 4 triangular broad spurs. Capsule globose, pustulate, especially when young, orange color.

Perak, Ipoh, Kinta, (Curtis 3141) Rocks on Bujong Malacca.

Allied to *G. aurantiaca* Miq. but less hairy, the peduncle being only softly pubescent; the sheathing leaves on the peduncle are very much larger and broader and the lip shorter and broader almost square in outline.

*Gl. variabilis*. Ridl. Trans. Linn. Soc. Vol. 3. p. 378.

Stems over a foot tall. Leaves ovate or lanceolate acuminate 4 inches long,  $1\frac{1}{2}$  inch broad, glabrous dark green above and purplish beneath. Panicles about 4 or 5 inches long rather compact with short branches. Bracts  $\frac{3}{4}$  inch long oblong

orange or scarlet persistent. Calyx straight lobes acute orange. Corolla tube more than twice as long, lobes oblong, upper one boat-shaped. Stamínodes lanceolate oblong shorter. Lip oblong cuneate bilobed broad  $\frac{1}{4}$  inch long orange with a chestnut spot. Filament  $\frac{3}{4}$  inch long, anther with 4 acute spurs the upper ones longest. Capsule subglobose wrinkled.

Pahang Woods near Kota Glanggi and Tahan.

This pretty plant is most closely allied to *G. atrosanguinea* of Borneo, and also to *G. Schomburgkii* Hook, of Siam. Its broad conspicuous orange or red bracts, add much to its beauty and make it a showy plant. The squared lip broadest at the tip resembles that of *G. perakensis* Ridl.

*G. cernua* Baker l. c. p. 205.

Stems several about a foot tall, bases purple. Leaves ovate acuminate cuspidate dark polished green above paler beneath 4 inches long,  $1\frac{1}{2}$  inch broad, petiole  $\frac{1}{4}$  inch long or less, ligule short broad truncate, sheath and midrib pubescent. Panicle short nodding six inches long, rachis pubescent, base nude except for some (about 6) lanceolate acute to oblong bracts, the largest  $\frac{1}{2}$  an inch long; branches short spreading an inch long. Floral bracts ovate oblong  $\frac{1}{4}$  inch long by  $\frac{1}{8}$  inch across persistent green. Flowers sessile clustered at the ends of the branches with one or more ovate yellow bracts. Calyx tubular  $\frac{1}{4}$  inch long equally lobes equal short blunt, yellow. Corolla tube slender pubescent nearly  $\frac{3}{4}$  inch long, light yellow lobes ovate boat-shaped  $\frac{1}{4}$  inch. Stamínodes linear oblong rather longer light yellow. Lip short oblong dilated towards the tip, bilobed lobes spreading acute, yellow with a central green spot,  $\frac{1}{4}$  inch long. Filament  $\frac{1}{8}$  inch long yellowish, anther spurs 4 upper ones subulate lower ones broader. Capsule wrinkled green.

Perak: Thaiping hills; Bujong Malacca; Gopeng (King).

This species, which appears to be local, though common on the Thaiping Hills, is easily recognized by its decurved panicles of lemon yellow flowers.

*Gl. brachycarpa* Bak. l. c. c.

Stem  $1\frac{1}{4}$  foot rather slender, sheaths hairy. Leaves ovate acuminate 5 inches long glabrous above, minutely pubescent

beneath, ligule very short glabrous. Panicle short nodding with a few distant short branches, lower bracts ovate lanceolate  $\frac{1}{4}$  inch long green persistent; branches  $\frac{1}{2}$  inch long, flowers 4 or 5 crowded at the ends. Calyx funnel-shaped entire  $\frac{1}{2}$  inch long. Corolla pale yellow, lobes ovate. Lip linear entire with a dark central spot. Anther with 4 equal triangular spurs. Capsule globose pustular.

Perak, Thaiping Hills 2-3000 feet. King (2414). (Curtis 2073).

Nearly allied to the last but distinguished by its broader persistent bracts at the base of the peduncle, and the calyx which is shaped like an old-fashioned conical goblet.

*G. versicolor* Smith. Exot. Bot. t. 117 is mentioned as occurring in the Malay Peninsula by Roxburgh and by Koenig, who collected it in Junk Ceylon, and saw it in a dwarf state near Malacca. (This latter plant was probably *G. panicoides*.) It does not seem to have been seen in our region since.

*G. bulbifera* Roxb. is stated in the Flora of British India to occur in the Malay Peninsula, but I have never seen it in a wild state, nor does it occur in any of the collections.

#### HEDYCHNIUM.

*H. longicornutum* Baker. Fl. Brit. India. vi. p. 228.

An epiphytic plant with very thick grey fleshy roots which clasp the branches or stem of a tree. Rhizome short. Stems several about two feet tall, stout. Leaves oblong acuminate glabrous except the margins which are hairy, dark green, purplish beneath, one foot in length and four inches wide, ligule oblong lanceate two inches long, sheath hairy. Flower spike terminal four inches long dense. Bracts lower ones ovate; upper ones narrower lanceolate, one inch or more long covered with brown silky hairs. Buds erect cylindrical acute scarlet. Calyx spathaceous oblique one inch long slender pink. Corolla tube cylindrical slender  $1\frac{1}{2}$  inch long, lobes narrowly linear deflexed red, three inches long by  $\frac{1}{2}$  wide. Staninodes and lip similar linear undulate reflexed orange color,  $1\frac{1}{2}$  inch long  $\frac{1}{4}$  inch wide. Stanen five inches long base stout tapering upwards pinkish at the base white above, anther linear oblong orange  $\frac{1}{2}$  an inch long. Stigma projecting beyond, club shaped. Capsule oblong with

rounded angles dark brown hairy  $1\frac{1}{2}$  inch long, dehiscing into three carpels, recurved bright orange within. Seeds sixteen in each cell, oblong angled  $\frac{1}{4}$  inch long covered with an aril of soft crimson processes.

Johore, near Castlewood. Muar (Fielding). Malacca: Ayer Panas; Merlimau; Woods at the base of Mt. Ophir, etc., common. Selangor, Gunong Hitam; Ginting Bidai. Perak, Larut Hills. Patani, Tomoh (Machado). Also Siak in Sumatra.

This very beautiful plant is widely scattered over nearly all of the Peninsula. It is epiphytic, growing usually rather low down on the branches of trees which it clasps with its curious fleshy roots, which resemble those of some orchid. The dense heads of flowers, with the long erect scarlet bands and the yellow recurved staminodes make it a most attractive plant. It is known to the Malays as Tepus Lada, and Ubat Chaching and the roots are used in cases of ear-ache, and as a vermifuge.

*H. microchilum* n. sp.

Epiphytic glabrous. Stem about 2 feet long  $\frac{1}{4}$  inch thick. Leaves 5 flaccid lanceolate acuminate dark green, tapering towards the base 9 inches long by two wide, ligule papery lanceolate acute  $\frac{1}{2}$  inch long. Raceme cylindric nodding 3 inches long covered with thin sheathing leaves (bracts) each containing 2 flowers. Bracteole exceedingly thin  $\frac{1}{4}$  inch. Calyx thin and papery tubular dilated above, apex acute,  $1\frac{1}{2}$  inch long. Corolla tube slender 2 inches long yellowish white, terete, lobes linear convolute or spirally twisted acute apple green  $\frac{3}{4}$  inch long. Lip very small orbicular retuse white  $\frac{1}{2}$  inch long. Staminodes oblanceolate obtuse white  $\frac{5}{8}$  inch long  $\frac{1}{4}$  inch wide. Stamen very short, filament thick  $\frac{1}{4}$  inch long, orange, anther as long dorsifixed curved, cells linear, with a deep groove between them, orange. Stigma elongate ovoid-triangular with a V shaped ridge at the base, deep green and hairy. Capsule oblong an inch long orange, splitting into three lobes and showing the numerous seeds enclosed in a red aril.

Java. Obtained from *Vanda tricolor* and cultivated. Flowers in August. Absolutely unique in the exceedingly rudimentary lip, and short filament. The plant appeared grow-



ing out of a tuft of Vanda, planted on a tree in the gardens.

*H. crassifolium* Baker. Fl. Brit. Ind. p. 228. I know nothing of, nor indeed by the description do I see anything to distinguish it by from *H. longicornutum* except that its bracts are said to be glabrous and not hairy. It was obtained in Perak by Dr. King's collector.

*H. macrorrhizum* n. sp.

Epiphytic, rhizome branched thick resembling that of ginger, forming a large mass on the tree. Roots thick terete. Stems about a foot tall,  $\frac{1}{4}$  inch through. Leaves lanceolate acute glabrous eight inches long by two wide tapering to a short petiole below, ligule short, obtuse. Spike nodding lax about ten inches long. Bracts oblong obtuse one inch long  $\frac{1}{4}$  inch wide about 12, distant green hairy at the base. Flowers two or three in each. Calyx narrow pubescent cylindrical nearly one inch long with two very short teeth. Corolla tube very slender  $1\frac{1}{2}$  inch long, lobes very narrow linear, one inch long. Staminodes similar. Lip narrow deeply bifid, lobes lanceate curved about  $\frac{3}{4}$  of an inch long, all white. Stamen slender  $1\frac{1}{2}$  inch exserted. Anther very narrow linear. Style shorter than the stamen.

Selangor on a lofty fallen tree. Pahang track, 15th mile.

*H. denticulatum* n. sp.

Terrestrial. Stems tufted about two feet tall numerous. Leaves lanceolate acuminate glabrous with small thornlike processes along the edge 8 inches long or more, 3 inches wide, petiole  $\frac{1}{2}$  inch long, sheaths finely hispid ribbed. Panicle terminal about a foot long branches short three flowered. Calyx brown papery tubular unequally bilobed  $\frac{1}{2}$  an inch long. Corolla tube straight cylindric. Dorsal petal narrow linear involute, apex cupshaped, pinkish, lower part green,  $\frac{1}{2}$  an inch long, lateral petals linear spatulate deflexed adnate to the lip at the base. Lip narrowly dilated at the apex and ending in three lobes, the lateral lobes curved forwards, the middle one bifid, all toothed, base of lip channelled, edges thickened red, the rest green. Staminodes narrow linear shorter than the petals red. Stamen long rather thick arched white pubescent nearly twice as long as the upper petal. Anther large oblong, pinkish. Style a little

longer. Capsule globose  $\frac{1}{2}$  an inch long crowned with the calyx.

Dindings in woods at Lumut, abundant flowering in July. This is perhaps the least showy species in the genus, but is not wanting in interest. The peculiar dorsal petal, terminated by a conical cap, the narrow linear lip deeply channelled and ending in a broad three-lobed toothed limb, and the thick arched stamen, make it very distinct from any known species. The flower resembles some curious insect. When dry the leaves are rough and scabrid. The capsule resembles more that of an *Alpinia* than that of a *Hedychium*.

*H. collinum* n. sp.

Terrestrial, a low tufted plant about 2 feet tall, with fairly stout stems. Leaves broad lanceolate acuminate cuspidate glabrous, six inches long by three broad, ligule oblong rounded at the tip one inch long and  $\frac{1}{2}$  an inch broad, spike rather lax nodding six inches long. Bracts oblong truncate quite obtuse about 20 on a spike, one and a half inch long, and half an inch wide. Flowers in pairs in the bracts. Calyx slender cylindrical  $1\frac{1}{2}$  inch long. Corolla tube twice as long, lobes linear narrow. Stamines broader linear  $1\frac{1}{4}$  inch long. Lip cuneate bilobed, lobes divaricate tapering shorter than the stamens, all white. Stamen very slender red, twice as long as the lip. Anther very small reniform with the basal points incurved.

Kedah Peak at an altitude at 4,000 feet.

This plant has somewhat the habit of *H. spicatum* Ham. but the stamen is very much longer than the lip.

*H. coronarium* Koenig, mentioned as occurring in Malacca in the Flora of British India is only so far as I have seen cultivated in the Malay peninsula.

#### CAMPTANDRA n. gen.

Herbaceous glabrous plants with a very small rhizome, stems erect one or few, leaves few ovate petiolate. Flowers several enclosed in a terminal green spathe, showy fugacious white or violet shortly pedicelled. Calyx tubular three-lobed, lobes equal. Corolla tube slender long, lobes lanceolate or oblong. Lip obovate bilobed. Stamens large obovate petaloid.

Stamen projecting beyond the tube. Anther long slender curved dorsifixed versatile, the base prolonged into two parallel processes, the upper part only polliniferous. Style slender, stigma capitate. Capsule oblong, seeds numerous small curved fusiform aril laciniate. Two species occurring only on hills in the Peninsula and in Borneo. These plants have been referred to the genus *Kæmpferia*, but though allied they are very distinct in the peculiar arrangement of the anther quite unique in the order. As in *Kæmpferia* the lip and staminodes are the showy part of the flower, being broad and petal like. On the lip at the base are two keels with a groove between leading to the tube which contains the honey. The anther is curved and narrow and fixed by the back on the filament so that it swings readily, and the lower part is prolonged into a pair of long spurs. When a bee visits the flower it follows up the groove of the lip to insert its proboscis into the tube, and as its head touches the processes of the anther and pushes them back it brings down the upper part of the anther (where alone is any pollen,) and the stigma upon its back. Of course on visiting another flower the same thing occurs, and the pollen of the first flower is brushed off by the stigma of the second and so the flower is fertilized. Unlike *Kæmpferia* the *Camptandras* often set fruit, although the flower is open only for a few hours in the morning. This is doubtless due to the more certain working of this neat though simple mechanism.

*C. parvula* n. sp. *Kæmpferia parvula* Bak. l.c. p. 233.

A small herb about six inches tall. Stems several covered with sheaths below, leaves 4 or 5 ovate acuminate oblique, and unequal sided dark green, base broad, 2 to 3 inches long one inch wide, petiole slender an inch long. Spathe ovate acute an inch long. Flowers small, 1 inch across. Calyx  $\frac{1}{4}$  inch long tubular green, lobes very short. Corolla tube half an inch long white, lobes oblong truncate mucronate. Lip oblong orbicular bilobed crenulate white, with an ocre patch on the ridges and some pink marks in the mouth. Staminodes subspathulate broad crenulate  $\frac{1}{2}$  an inch long white. Anther curved crescent-shaped, moveable. Stigma subtriangular. Capsule oblong thin  $\frac{1}{2}$  an inch long, seeds numerous small fusiform

curved, dotted black with an aril of whitish linear processes. Common on rocks and banks at 2000—4000 feet.

Selangor; Bukit Kutu. Pahang, Tahan river. Penang, Government Hill. Perak, Thaiping Hills, Bujong Malacca, Goping (King 823). Tomoh (Machado).

*Var. angustifolia.*

Leaves lanceolate acuminate, 3 inches long by  $\frac{1}{2}$  to one inch base narrowed into the petiole, petioles longer and more slender.

Borneo, Sarawak, near Matang (Haviland, cm. m. i.)

*C. lalifolia.* n.sp.

Stem two feet tall or less, succulent. Leaves 1 to 4, cordate acuminate 5 inches long and 2 inches wide dark smooth, petiole one inch purple. Spathe ovate green an inch and half long. Flowers several white or violet showy, Calyx tubular three-lobed spotted red. Corolla tube  $1\frac{1}{2}$  inch long white, lobes lanceolate obtuse white. Lip orbicular bilobed  $1\frac{1}{2}$  inch across white or violet, the ridges at the base yellow. Staminodes oblong obovate rounded white or violet. Anther long narrow curved, base bifid translucent. Capsule oblong fawn-coloured  $\frac{1}{2}$  inch long, seeds numerous.

Perak. Bujong Malacca; 3000-4000 feet alt, fl. Sept. on rocks or the ground. Without locality (Dr. King, No. 7219.) This is a very much larger and succulent plant. It has a very short rhizome and the stems are usually solitary, somewhat thickened at the base. The flowers are large and vary from pure white to violet. They last only a few hours. The seed often germinates in the spathe.

#### KÆMPFERIA.

Hardly any species of this genus have yet been found wild within our boundaries, though some kinds occur in the Lankawi islands and in Southern Siam. A few however are cultivated as spices by the Chinese and occasionally turn up in waste ground.

The genus is confined to the original *K. rotunda* L and its allies is a fairly distinct one, but unfortunately, *Gastrochilus pandurata* was described by Roxburgh as a *Kæmpferia* and

later botanists added more of this very distinct genus, so that it was absolutely proposed to amalgamate the two. The genus *Kamperferia* may be thus defined. Herbs with an underground rhizome often tuberous and aromatic, stem short or produced, rarely absent. Leaves thin in texture few or several. Inflorescence spicate subterminal with thin lanceolate bracts. Flowers showy thin textured and very fugacious, opening singly violet or white. Calyx short cylindric. Corolla-tube long slender lobes narrow linear inconspicuous. Staminodes very large rounded horizontal clawed, forming with the rounded bilobed lip a nearly circular flower. Stamen short thin flat with a long narrow petaloid crest. Anther thin and usually concealed in the tube, linear not versatile and dorsifixed. Style slender. Capsule (rarely produced) oblong thin walled.

Distribution: India, Burmah, Siam and Cochin China.

The thin flat staminodes usually of the same color as the lip and lying in the same plane form the conspicuous part of the flower, the petals being much smaller and usually reflexed, hidden behind the staminodes and lip. The entrance to the nectary is very small and is partly blocked by the crest of the anther.

The genus can readily be divided into sections, viz. 1. *Sincorus* (Horan) stem very short, flowers appearing with the leaves. This includes *K. Galanga* L sometimes cultivated here by the Chinese; *K. marginata* Carey. *K. speciosa* Bak. *K. Roscoeana* Wall; natives of Burmah. *K. elegans* Wall. Siam (Curtis.) and Burmah. *K. angustifolia* Roxb. Bengal, also Siam (Dr. Keith.) *K. ovalifolia* Burmah and Siam, also collected in Malacca by Col. Farquhar according to Baker, but doubtless cultivated there. *K. pulchra* Ridl. Lankawi and Siam. *K. glauca* Ridl. Siam. *K. undulata* Teyssm, locality unknown.

Sect. 2. *Protanthium*. Leaves and flowers appearing at different times, including only *K. rotunda* L "*Kunchur*" of the Malays only cultivated here, and *K. candida* Wall. of Burmah.

Sect. 3. *Monolophus*; with an erect rarely prostrate leafy stem. *K. linearis* Wall, *K. secunda* Wall. *K. sikkimensis* King of India. *K. macrochlamys* Baker of Burmah and *K. decus-sylvae* Hallier of Borneo, a peculiar prostrate form.

Sect. 4. *Stachyanthesis* with a leafy stem and flowers in a long spike. *K. scaposa* Benth. India.

Excluded from the genus are *K. pandurata* Roxb., *K. Prainiana* King, *K. concinna* Bak. *K. parviflora* Wall. *K. anomala* Hallier, all of which belong to the genus *Gastrochilus* as probably do *K. involucrata* King, *K. Andersoni*, and *K. siphonantha* Bak. from India and Burmah, and *K. purpurea* Koen. (Retz observ. iii. 57) Junk Ceylon. *K. parvula* King is *Camptandra parvula* Ridl.

*K. pulchra* n. sp.

Leaves two ovate blunt spreading out usually flat on the ground, blade seven inches long by five inches across, petiole short, three inches long, dark olivaceous black with grey markings above. Inflorescence between the leaves, peduncle three inches long green terete, spike sub-cylindric one inch long covered with persistent convolute bracts, the outer one brown and ribbed the inner ones about 20, thin white, lanceolate. Flowers numerous produced singly at considerable intervals of time, thin fugacious. Calyx very thin tubular. Corolla tube about an inch long very slender white, lobes linear obtuse white reflexed  $\frac{1}{2}$  an inch long. Staminodes and lip connate below. Staminodes obovate as long as the lip obtuse, mauve. Lip deeply bilobed, lobes oblong apices rounded  $\frac{1}{2}$  an inch long, mauve with the base pale yellowish white. Stamen, filament very short. Anther narrow oblong, crest very long linear apex entire rounded recurved. Style much shorter than the appendage and projecting but little beyond the anther, stigma two lipped, lower lip prolonged.

Siam. Bangtaphan very common in dry places. (Dr. Keith). Lankawi (Curtis). This pretty plant which has long been cultivated in Singapore is nearly allied to *K. Roscoeana* Wall, but differs in the mauve not white flower, and the remarkably long entire anther appendage which is longer than the rest of the stamen. The anther and style are hidden in the tube, being much shorter.

*K. glauca* n. sp.

Leaves 3 unequal orbicular cuspidate, the largest five inches long by three wide, glaucous green. Flowers numerous in a spike almost hidden between the leaves. Bracts lanceo-

late acuminate about an inch long, narrow, spotted with red. Calyx one inch long tubular spathaceous entire spotted red, Corolla tube cylindric two inches long,  $\frac{1}{8}$  inch thick pale violet, lobes lanceolate cuspidate  $\frac{1}{2}$  an inch long  $\frac{3}{16}$  inch wide, white spotted with red at the tip. Lip orbicular cleft nearly to base, inner edges straight violet with a white spot at the base, one inch across. Staminodes orbicular narrowed at the base  $\frac{1}{2}$  an inch long and wide, violet. Stamen, with the anther entirely outside the tube nearly  $\frac{1}{4}$  inch long, cells parallel rather fleshy pollen white, crest large reniform recurved broad entire violet. Style longer than the anther purple, stigma capitate deep red purple. Siam, Kasum, (Curtis).

This curious and pretty plant grows abundantly on the limestone rocks of Kasum, the rhizomes being imbedded so deeply in chinks of the rock that it is necessary to break away the rock to get at them. The gray green leaves and violet flowers make it an attractive plant. Structurally its most remarkable point is that the anther projects outside the tube entirely, instead of being concealed within as in the case of *K. elegans*, etc, and the style is also visible from the outside.

#### GASTROCHILUS.

This genus was first distinguished by Wallich who described two species from *Kæmpferia* as it then stood by the lip being saccate or basin shaped, and by the habit. This form of the lip is peculiar to a few species only of the plants which I would refer to the genus, and which as I have already said is very distinct from the true *Kæmpferia*. The genus may be thus defined. Small herbs with a short rhizome. Stem tall and leafy or short. Leaves usually several together lanceolate or ovate. Inflorescence spicate with large bracts sometimes colored springing from the axils of the leaves, or independently on the rhizome or terminal when the stem is tall. Flowers thin white, yellow or red. Calyx tubular. Corolla tube rather long slender lobe oblong or lanceolate. Staminodes similar but slightly longer erect. Lip oblong or obcuneate entire or three lobed. Stamen thick and fleshy with an oblong anther, the crest of which is small rounded or lobed.

Distribution : India, the Malay peninsula and islands.

The species can be divided into three groups. *Acranthi*, in which the flower spike is borne on the top of a leafy stem; *Mesanthi* from the centre of a leaf tuft; and *Exanthi* outside the leaf-tuft. The last group suggests a close affinity with the *Curcumas*, of the section *Hitcheniopsis*, the real difference being the shape of the bracts and their more cone-shaped arrangement. Indeed *C. Kunstleri* might almost as well be put in *Gastrochilus* as in *Curcuma*. *Gastrochilus* described by Baker and referred to the neighbour... *Hitcheniopsis*, is truly a *Gastrochilus*, though in some respects a curious form.

The *Gastrochili* inhabit woods, and though the species are usually local, that is to say restricted in area, they usually occur in quantity when met with. The flowers, which are very delicate and pretty, often sweet scented, open one at a time about midday, withering towards evening. They very rarely produce fruit. Many species are well worth cultivating, and grow readily in pots, or in shady spots in the ground.

As the genus has been so much confused with *Kæmpferia* I submit a list of all species known to me with localities.

§ *Acranthi*.

*G. pulcherrima* Wall. India and Siam,

*G. rubrolutea* Bak. India.

*G. ochroleuca* Ridl. Siam.

*G. albosanguinea* Ridl. Perak.

§ *Exanthi*.

*G. Prainiana* (Bak). Perak.

*G. tillandsioides* Bak ? Perak.

*G. concinna* Bak. (sub *Kæmpferia*) Perak.

*G. calophylla* Ridl. Selangor.

*G. oculata* Ridl. Selangor.

*G. biloba* Ridl. Pahang.

*G. Hallieri* Ridl. \**Kæmpferia anomala* Hallier Bulletin Herb. Boissier. VI. p. 357 pl. 10.

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\* There being nothing anomalous in this plant, I have taken the liberty of altering its specific name as well as its generic one.



§ *Mesanthi*.*G. longiflora* Wall. India.*G. minor* Bak. Perak.*G. scaphochlamys* Ridl. Malacca.*G. lancifolius* Ridl. Johor.*G. longipes* King. Perak.*G. Curtisii* Lankawi.*G. clivalis* Ridl. Selangor.*G. angustifolia* Hallier. Deli, Sumatra.*G. pandurata* Ridl. India.*G. parviflora* (Wall.) (sub *Kæmpferia*) Burmah.*G. involucrata* (Wall.) India.*G. Andersoni* (Bak) Burmah.*G. parvula* Wall. India*G. ochroleuca* n. sp.

Stem over a foot tall. Leaves distant lanceolate acuminate base broad inequilateral 5 inches long over one inch wide, petiole one inch, sheaths  $1\frac{1}{2}$  to 2 inches long, ligule short rounded, spike terminal short, shorter than the upper leaves. Bracts lanceolate acute deep green. Flowers nodding, Calyx cylindric, as long as the blunt bracteole. Corolla tube twice as long cylindric, lobes oblong lanceolate blunt  $\frac{1}{4}$  inch long. Staminodes broader much shorter than the lip white. Lip obovate nearly flat  $\frac{3}{4}$  inch long by half an inch wide submucronate, yellowish white with an orange spot on the central bar. Stamen shorter than corolla-lobes, fairly stout cylindric, anther linear crest short, style thick decurved stigma large.

Siam. Between Kasum and Pungah. Flowered in Penang gardens Nov. 1896. (Curtis).

*K. pulcherrima* Wall. Pl. Asiat. Rar. 122 t 24. A native of Burmah and Siam is recorded from Penang (Maingay) in the Flora of British India. This must surely be a mistake.

*G. longiflora* Wall. l.c. 25, is also recorded from Malacca.

without collector's name. I have seen no specimen.

*G. albo-sanguinea* n.sp.

Plant 12-18 inches tall, stem leafy. Leaves about six oblong lanceolate acuminate bases broad rounded, blade eight inches long, by  $2\frac{1}{2}$  across, glabrous, petiole rather slender two inches long, sheaths about six inches. Spike central shorter than the upper leaves about five inches long. Bracts lanceolate acute closely appressed. Calyx spathaceous  $\frac{1}{4}$  inch long truncate. Corolla tube one inch long, hardly longer than the bracts, lobes linear incurved white. Stamínodes porrect, and curved up overlying the upper edges of the lip, oblong obtuse, white with a pink tinge. Lip saccate white with an everted red margin about  $\frac{3}{4}$  inch long. Stamen slender, filament fairly broad flattened. Anther linear half an inch long, crest none.

Perak, on Maxwell's Hill, collected by Mr. F. A. Wooldridge and flowered in the Botanic Gardens, Penang, September 1894.

This pretty plant is distinguished by the lip being narrowed at the base with the sides turned up and the edges turned out and down. The staminodes lying along the upper edge of the lip enclose it so that a bee or other insect must creep in so as to get at the honey.

The plant is very closely allied to *G. pulcherrima* Wall, differing in the more convolute lip and longer petioled leaves. An exceedingly similar if not identical plant occurs also in Lankawi (Curtis 2677).

*G. minor* Bak. Fl. Brit. Ind l.c. 217.

Rhizome very short, leaves about 4 in a tuft oblanceolate obtuse about 4 inches long,  $1\frac{1}{4}$  across, dark green with a central silvery bar, petiole about an inch long; sheaths red. Spike short from the centre of the leaves. Bracts yellowish. Flowers large and showy. Calyx tubular. Corolla tube not longer than the bract, lobes oblong obtuse yellow. Stamínodes oblong obtuse yellow with red spots at the base. Lip an inch long  $\frac{1}{2}$  an inch across, flat, oblong obtuse with a central keel running the whole length and bifurcating at the apex yellow darkest towards the apex with crimson spots at the base. Stamen long pink, filament

linear thick arched, anther somewhat broader cells divaricate at apex, crest rounded obscurely three lobed, rather small. Style slender shorter than stamen. Stigma cuneate, stigmatic surface terminal.

Perak. Batang Padang (Curtis); Bujong Malacca abundant; Larut (King's collector).

A very pretty plant with its dark green and silver barred foliage. The name given to it is not very suitable as it is larger than a good many species, and has the largest flowers of any. The flat lip and arched stamen are peculiar points in it.

*G. Scaphochlamys* n. sp. *Scaphochlamys Malaccana* Bak. Fl. Brit. Ind. p 252. Rhizome creeping long with stout roots. Leaves in tufts of two or three, with a few sheathing at the base lanceolate inequilateral acute or blunt, dark green, six or seven inches long  $1\frac{1}{2}$  inch broad, pubescent, especially along the midrib, petiole 3-4 inches long pubescent. Scape central 5 to 9 inches long, pubescent. Bracts spiral lingulate blunt green with red sheaths, pubescent one inch long  $\frac{1}{2}$  inch wide. Flowers white, with a yellow bar on the lip, sweet-scented.

Corolla tube slender one inch long, lobes oblong lanceolate  $\frac{1}{2}$  inch long. Staminodes as long and similar. Lip obovate undulate bilobed. Stamen broad white, anther cells narrow, crest very large and orbicular. Style shorter than the crest.

Malacca. Woods on Mount Ophir, (3141); Bukit Muar (Feilding).

The chief peculiarity of this plant is the curious spirally arranged bracts which gradually spread out as the spike develops. The rhizome too is more widely creeping than is usual, otherwise the plant is quite normal.

*G. lancifolius* n.sp.

Rhizome rather slender. Leaves in pairs lanceolate acuminate acute inequilateral, blade 7 or 8 inches long by 2 inches wide glabrous, petioles five inches long, sheathing for about half their length. Spike central 3 inches long zigzag with 5 or 6 green oblong cuspidate distant bracts  $\frac{1}{2}$  to one inch long. Flowers rather small yellow, three in a bract. Calyx short tubular  $\frac{3}{4}$  inch. Corolla tube long and slender one inch long, lobes linear  $\frac{1}{4}$  inch. Lip half an inch long bilobed, lobes rounded. Staminodes ob-

long rounded nearly as long as the corolla lobes but broader. Anther with linear parallel cells, crest large broader than the anther broadly cuneate shortly three-lobed.

Johore. Kwala Sembrong (Lake and Kelsall 1892).

This is most nearly allied to *G. scaphochlamys* Ridl. but has smaller bracts, and flowers with longer corolla tubes, and a different crest.

*G. longipes* King and Prain mss.

Rhizome rather far-creeping. Leaves two, blade elliptic ovate eight inches long by four wide subacute glabrous, petiole 9 inches long, 3 inches sheathing. Spike central 2 inches long. Bracts narrow lanceolate few and long. Corolla tube long and slender, lobes lanceolate half as long as the lip. Lip entire oblong apex rounded edges crisped and thickened central bar much thickened  $\frac{1}{4}$  inch long. Staminodes broader than corolla lobes, and longer than the lip. Stamen, filament rather slender, anther oblong, crest rather large oblong rounded. Style considerably longer. Stigma broadly obconic.

Perak. Biah, Larut (Wray 4220).

This resembles *G. lancifolius* in the form of the spike and the flower especially in the entire crisped lip. The foliage however is very distinct at two leaves being very large and broad with very long petioles. The long decurved style projecting some way beyond the anther is unusual but is matched in *G. Curtisii*.

*G. Curtisii* Baker. Bot. Mag. t. 7363.

Leaves four in a tuft, blade ovate oblong acute, 5 inches to a foot long, two to six inches across, bright green pubescent on the back, petiole stout six inches long, sheaths broad about 2 inches long purplish. Spike central shorter than the petioles about an inch long. Bracts oblong, white, as long as the calyx. Calyx tube white cylindrical, lobes lanceolate acute pubescent, one inch long. Corolla tube two inches long cylindric dilated a little at the top, lobes oblong lanceolate one inch long. Staminodes a little shorter, all white. Lip longer oblong obtuse flat, yellowish cream with red marks on the sides. Stamen, filament cylindrical pubescent, anther short and thick, crest short broad

truncate. Style considerably longer thick above the anther, stigma cup-shaped.

Lankawi Islands on limestone rocks, (Curtis 2896).

The most peculiar point about this plant is that the anther cells apparently open at the top only and do not split for their whole length as is usual. There is a large depression behind the anther formed by the broad and short crest from which the long style protrudes. The back of the leaves are pubescent, and in the picture the upper surface is represented so also, but I do not see any hairs here in the specimen, nor are they mentioned in the description.

*G. clivalis* n. sp.

Rhizome rather slender with long roots. Leaves 3 or 4 in a tuft, ovate to lanceolate acute narrowed at the base into the petiole inequilateral  $4\frac{1}{2}$  to 8 inches long and 2 inches wide, petiole 5 or 6 inches long sheathing for about 3 inches, all glabrous except about the midrib on the back which bears scattered hairs. Spike central 3 inches long, enclosed in the sheaths. Bracts long and narrow containing four or five flowers each with two long narrow linear acute transparent bracteoles one inch long and  $\frac{1}{8}$  inch wide. Calyx tube very narrow half an inch long, with three lanceolate lobes, two longer than the third. Corolla tube slender dilated a little upwards 2 inches long, lobes linear  $\frac{1}{2}$  an inch long by  $\frac{1}{8}$  inch wide. Lip oblong entire apex rounded, crisped, median bar thickened. Staminalodes of the length of the corolla lobes but broader and blunt. Stamen filament rather slender, anther oblong thick with an oval crest longer than the club shaped stigma.

Selangor, Pahang Track, 15th Mile, on banks.

*G. pandurata*. Ridl. *Kæmpferia pandurata*. Roxb. Asiat. Res. XI. 320 t. 2.

The "Temu Kinchi" of the Malays is sometimes cultivated here, the rather stout rhizome which is yellow inside and very aromatic being used in medicine. It is probably a native of India. The leaves are about 5 in a tuft oblong ovate with a broad base and long petiole. The spike is short and central. The flowers are white or pink, lip saccate white with pink spots.

*G. Prainiana* n. sp. *Kämpferia Prainiana* Bak. l.c. 220.

Leaves lanceolate acute 8 inches long  $1\frac{1}{2}$  wide, pubescent on the back with a petiole of equal length and a long slender spike of many imbricate bracts, rising directly from the rhizome about 9 inches tall. Flowers red and white. Corolla tube an inch long, lobes  $\frac{1}{2}$  an inch oblong ascending, lip oblong cuneate much longer.

Perak, Goping, (King's collector, No. 226.)

My specimen has no flower, but the plant is very distinct in its long sessile cylindric spike. It should be sought again in the Kinta valley.

*G. tillandsioides*. Bak. l.c. based on a drawing made by Kunstler from a plant probably collected in Perak, I have not seen, and as far as description goes I see but little difference between it and the preceding.

A very curious plant I found at the base of Gunong Pantl in Johore, has unusually large leaves ovate glabrous 9 inches long and 6 across, petiole 7 inches and one or more cylindric imbricated spikes in the centre, 6 inches long, the bracts  $1\frac{1}{2}$  inch long. I could find no trace of flowers, but imagine it belongs to this genus and if so is by far the largest species.

*G. calophylla* n. sp.

Rhizome short rather slender. Leaf solitary obovate rounded rather thick six inches long and four across, deep bluish green above with a white feather on each side, rosy pink beneath, petiole two inches long or more channelled rather stout. Inflorescence close to the leaf and enclosed with the petiole in a red sheath, about as long as the petiole. Bracts narrow lanceolate red, blunt with a minute point,  $\frac{3}{4}$  inch long rolled round the base of the flower, two to each spike. Spikes six in the inflorescence, on a peduncle an inch long. Calyx tubular very short. Corolla tube one inch long lobes lanceolate acute  $\frac{3}{4}$  inch long. Staminodes much shorter oblong obtuse rounded. Lip obovate bifid at the apex. All white except for a stain of pale yellow in the centre of the lip. Stamen short, anther oblong pubescent, crest broader than the anther rounded retuse. Stigma cup-shaped.

Selangor. In thick woods on the Pahang track. Flowered in May.

This is a very pretty foliage plant and one well worthy of cultivation. The deep blue green leaves with the white band on each side and deep rose pink backs make it very attractive.

*G. concinna* n.sp. *Kæmpferia concinna*. Baker. Fl. Brit. Ind. l.c. 221.

Rhizome slender. Leaf solitary, petiole very long and slender 9 inches tall, blade lanceolate acuminate with a broad cordate base six inches long, one and a half broad glabrous. Scape three inches long, peduncle one inch long enclosed with the base of the petiole in two sheaths, one longer than the scape. Bracts lanceolate acute rather thin glabrous red one inch long. Calyx very short. Corolla tube slender longer than the bracts, gradually dilated to the throat, lobes white with dark red stripes. Lip oblong margins incurved. Anther crest small entire.

Perak. Ulu Bubong. (Dr. King's collector 10135).

I have only seen dried specimens of this, and those in not very good condition. Its most striking point is the remarkable length of the slender petiole and the cordate base of the leaf.

*G. bilobu* Ridl. Trans. Linn. Soc. Vol 3. 379.

Rhizome long slender. Leaf solitary, petiole six inches long pubescent, blade lanceolate to elliptic oblong obtuse 6 to 8 inches long, 3 to  $3\frac{1}{2}$  broad, base rounded, dark green with silvery bands above, purplish beneath, midrib pubescent. Scape lateral base of peduncle enclosed with base of petiole in a long narrow sheath 4 inches long. Peduncle 2 inches or less. Spike one inch long. Bracts lanceolate acute dark red. Bracteoles 2 lanceolate thin. Calyx  $\frac{1}{2}$  an inch long tubular dilated upwards, pale with red transverse bars and short obtuse lobes. Corolla tube  $1\frac{1}{4}$  inch long slender white, lobes lanceolate acute reflexed  $\frac{3}{4}$  inch long  $\frac{1}{4}$  inch wide white. Lip oblong bilobed, lobes rounded obtuse nearly an inch long  $\frac{3}{4}$  inch wide white tinted with pink. Staminodes more oblong  $\frac{1}{2}$  an inch in length obtuse white, anther oblong wide, cells narrow linear, crest rather large rounded ovate subacute.

Pahang at Kwala Tenok; Tahan river. July 1891.

*G. oculata* n.sp.

Rhizome rather long creeping. Leaf solitary ovate glabrous 8 inches long by  $4\frac{1}{2}$  wide, dark green, purplish beneath, prominent nerves about 14, petiole 10 inches long or less. Scape short lateral, peduncle 1 inch long enclosed in the sheath with the base of the petiole. Spike  $1\frac{1}{2}$  inch long. Bracts ovate to lanceolate  $\frac{1}{2}$  an inch long red, lower ones blunt, upper ones acute. Flowers 2 in a bract. Calyx  $\frac{1}{2}$  inch long, lobes 2 very short. Corolla tube an inch long slightly dilated upwards, lobes lanceolate acute  $\frac{3}{4}$  inch long. Stamminodes oblong lanceolate obtuse broader, pubescent  $\frac{1}{2}$  inch long white. Lip obovate bilobed,  $\frac{1}{2}$  an inch long and as wide white, centre yellow and 2 deep crimson patches at the base. Stamen filament short and broad, anther thick, cells divaricating with a deep groove between, pubescent, crest very short rounded.

Selangor, Pahang track on banks at about 1500 feet altitude.

#### CURCUMA.

The Turmeric is not very strongly represented in the Malay Peninsula. The head quarters of the genus lying further north in Northern India and Burmah. Very few occur in the Malay islands and of those that do it may be doubted whether most of them are not aliens. The genus is closely allied to *Gastrochilus* chiefly differing in the cone-like flower spike with very broad bracts, the upper ones often differently colored from the lower ones, and as long or longer than the flowers. The rhizome is usually stout and strongly aromatic and bears tubers either sessile or on long stalks, but in the species which frequent our damp and shady jungles it is more slender, and often produces no tubers. Indeed these fleshy tuberous rhizomes appear to be adapted for food stores during the dry seasons, and thus as there are no dry periods in the Malay jungles they are unnecessary. The leaves are borne in tufts on the rhizome and are from two to six or more in a tuft, usually oblong, or oblong ovate with long petioles. The flower spikes are in all our native species produced in the centre of the leaf-



tuft, and thus belong to the section *Mesanthia* of Horaninow. One species of the section *Exantha* with the spike outside the tuft (*C. Zedoaria*) is commonly to be met with round villages, where it is cultivated. The flower spikes are borne on stout stalks and are shorter than the leaves. They have large and broad membranous bracts closely set, in the axils of which are two or more thin textured fugacious flowers, which project usually but little beyond the bract. The flowers open, one or two at a time upon the spike. The calyx is very short cylindrical and toothed. The corolla tube is usually slender enlarged upwards, the petals oblong or ovate oblong, the staminodes very similar and connate with the stamen. The lip broad rounded entire or more or less lobed. The anther, usually large, has in some species a small round crest, in others there is none. In many species it is spurred with curved processes, the use of which has been explained and illustrated by Forbes. (Wanderings of a Naturalist, p. 248) where he shows that they act as levers to rotate the anther upon the back of a bee when entering the flower in search of honey so as to deposit the pollen on its back. In these species the anther is moveable upon its filament, but in the other species there is nothing of this arrangement and the anther is not moveable. The fruit which is very rarely produced is a globose capsule with numerous seeds.

Several species are cultivated by the Malays, but except *C. longa* L. the turmeric, and *C. Zedoaria*, the Zedoary, only in small quantities, and as several kinds known by Malay names never seem to produce flowers, it is impossible at present to identify them. Of these Temu hitam, rather a small kind, has the rhizome light blue inside, and a taste of Turkey rhubarb, but somewhat bitter and slightly hot. The leaves are rather flaccid dark green and glaucous.

Temu lati, or Temu badoh, is a very much larger kind with deep green leaves the blade over two feet long and five inches wide with an obscure brownish mark in the upper part of the midrib, and the petiole winged, six inches long and half an inch through. The rhizome is very light blue inside and has a musky taste.

Temu pauh has a yellow rhizome with a smell and taste of wild carrots.

*C. Zedoaria* Roscoe, Scitamineæ. t. 109. *Curcuma zerbumbet* Roxb. As. Res. XI. 333. *C. Sumatrana* Miq. Fl. Sumatra. p. 615.

Rhizome large with oblong rounded tubers, orange colored inside. Leaves in pairs  $1\frac{1}{2}$  foot long and six inches across lanceolate cuspidate glabrous bright green with a central purple brown bar. Scape outside the tuft of leaves, peduncle  $1\frac{1}{2}$  foot long,  $\frac{1}{4}$  inch through covered at the base by a sheath six inches long, green with an obtuse apex, and cleft to the base. Spike six inches long or more, with about twenty bracts, the lower ones green more or less tipped with pink, the terminal ones lanceolate deep crimson thinner in texture; the lower ones two inches long and  $1\frac{1}{2}$  inch wide rather soft quite blunt and rounded. The flowers are four to each bract. Bracteoles thin transparent white hardly an inch long lanceolate. Calyx thin transparent with a ring of erect hairs at the base,  $\frac{1}{4}$  inch long, bifid slightly hairy all over, apices rounded. Corolla tube an inch long funnel-shaped yellowish white, the lobes half an inch long pure white, thin,  $\frac{3}{8}$  inch across, the upper one mucronate. Lip obovate oblong over one inch long dilated towards the apex, which is bifid, pale yellowish with a thicker central bar; the apex orange with a faint purple line along each side of the bar. Stamminodes oblong larger and stiffer than the petals obtuse erect. Stamen filament for the greater part adnate to the staminodes, ovate white, the anther mobile oblong squared pubescent, the basal processes horn-like acute; pollen white. Ovary nearly  $\frac{1}{4}$  inch in length hairy. Style projecting beyond the stamen. Stigma transversely oblong.

The Zedoary is known to the Malays as Temu Lawas. It is frequently cultivated and often persists in waste land after cultivation is abandoned and seems to establish itself thoroughly. It frequently grows among lalang and generally flowers there, but it is not easy to flower it in a pot or in really good soil. It is a very handsome plant when in flower, and its foliage is also ornamental. It is said to be wild in the Eastern Himalayas and is cultivated all over the East.

Singapore, common. Penang, roadside near Balik Pulau. Kedah, Yan: Siam at Bangtaphan (Dr. Keith). Also Celebes at Minahassa (Koorders 19671.5)

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*C. longa* L. Turmeric, "Kunyet," is often cultivated by Chinese, but I have never seen it establish itself anywhere as Zedoary does. It is a much smaller plant with light green leaves, and a short spike with pale green bracts at the base and pink ones at the top. The flowers are yellow.

*C. grandiflora* Wall. Baker Fl. Brit. Ind. l.c. 216. Malay Peninsula, Wallich. I have never seen anything like here. There is some doubt as to where the plant came from, but it was probably not collected in the peninsula.

*C. (Hitcheniopsis) Kunstleri* Bak. l.c. 214.

Rhizome horizontal rather stout. Leaves in pairs obovate cuspidate 12 inches long and six inches across above deep green shining ribbed, the back purple pubescent, keel thick channelled four inches long. Spike from between the leaves about four inches long broad shortly peduncled. Bracts few about an inch broad with rounded apices deep red; inner bracts shorter oblong ovate cartilaginous deep red. Flowers rather large protruded from the bracts. Calyx nearly half an inch long cylindric deeply split apex obscurely trifid red. Corolla tube an inch long enlarged upwards white; lobes lanceolate acute  $\frac{1}{2}$  an inch long white. Stamines oblong obtuse striate white pubescent. Lip obovate obtuse denticulate apex bilobed, base channelled. edges of channel elevated, yellow darker in the centre and at the base with a few pink streaks. Stamen pubescent with a broad filament, anther oblong  $\frac{1}{4}$  inch long emarginate. Stigma small rounded and beaked. This plant grows in dense damp jungles often in great masses. The leaves are usually purple on the back, but sometimes all green. It is very easy to grow and flowers readily. The structure of the flower is quite that of a *Gastrochilus*, from which genus it really chiefly differs in the large broad bracts like those of other *Curcumas*.

Perak. Thaiping Hills (Curtis, Wray No. 3702, 3662, 3388) Tapa (Wray 193) Dindings on Gunong Tungul.

*Var. rubra*. Stamines and lip and anther dark yellowish red.

Perak. Kwala Dipang, at the base of the limestone cliffs.

*C. sylvestris* Ridl. Trans. Linn. Soc. vol. 3 p. 378.

Rhizome slender creeping for some distance. Leaf solitary with a slender petiole  $1\frac{1}{2}$  feet long, blade ovate acute eight inches long four and a half inches wide, green above purple beneath, glabrous. Scape slender four to six inches long close to the leaf and enclosed with the petiole at the base by a large sheath; spike obconic  $1\frac{1}{2}$  inch long. Bracts broad ovate with the points recurved rosy. Flowers small white. Corolla with a slender tube  $\frac{1}{2}$  an inch long, lobes narrow linear acute  $\frac{1}{2}$  an inch long. Lip oblong obovate emarginate, the lobes rounded white with a yellow central spot, and some violet streaks on the lobes. Staminodes broader than the petals lorate obtuse white. Stamen with a broad filament, anther oblong with the crest broad recurved obtuse dark violet, cells narrow linear.

Pahang, Tahan Woods.

*C. parviflora* Wall. Fl. As. Rar. 147. t 57. collected by Wallich near Prome in Burmah has been found by Dr. Keith in Siam.

#### CONAMOMUM n. gen.

Stout plants with a woody rhizome elevated above the ground. Leafy stems tall. Leaves oblong lanceolate. Scapes on the rhizome peduncled with dense spikes of flowers, bracts stiff green or brown persistent. Calyx tubular with three equal regular lobes. Corolla tube short and thick, lobes unequal, the upper one largest oblong. Lip three-lobed or entire. Staminodes linear smaller than corolla lobes. Stamen short and broad, anther with curved linear arms above. Capsule subglobose or oblong.

These plants have the general habit of *Geostachys*, but possess free staminodes of some size, and the curved arms of the anther like those of *Amomum*.

*C. citrinum*. n. sp.

Leaves oblong lanceolate cuspidate, base acute a foot or more long, 3 inches wide, glabrous, midrib stout, petiole short winged, ligule  $\frac{1}{4}$  inch long. Scapes several about 13 inches tall. Peduncle 8 inches long and nearly  $\frac{1}{4}$  inch through, stiff with

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numerous oblong truncate green sheathing leaves 2 inches long split almost to the base; spikes very dense many flowered. Bracts light green stiff ovate acute  $\frac{1}{2}$  inch long. Bracteole broadly ovate nearly encircling the flower. Calyx shortly tubular thinly cartilaginous, with three equal lobes,  $\frac{1}{4}$  inch long  $\frac{3}{8}$  inch wide. Corolla tube short and thick, lobes elliptic oblong obtuse translucent white, upper one  $\frac{1}{2}$  an inch long and  $\frac{3}{8}$  inch wide, the lower ones shorter. Staminodes short linear from a broad base blunt pale red. Lip three lobed, lateral lobes erect rounded midlobe oblong obtuse rounded  $\frac{1}{4}$  inch across, centre depressed thickened bright yellow with pale red stripes on the side lobes. Stamen  $\frac{1}{2}$  an inch long, filament linear, anther dilate, with two curved linear arms  $\frac{1}{8}$  inch long. All yellow spotted with red. Stigma clubbed with a narrow transverse slit. Capsule globose  $\frac{1}{2}$  an inch long dark purple, seeds numerous.

Perak. Maxwell's Hill (No. 2959), Bujong Malacca (9788.)

*C. utriculosum* n. sp.

Rhizome very large elevated considerably above the ground on stout roots, thick. Stems about six feet tall clubbed at the base. Leaves lanceolate or oblong lanceolate cuspidate narrowed at the base, 16 to 18 inches long 2 to 4 inches wide, glabrous, petiole one inch long or less channelled, ligule oblong obtuse glabrous. Spike terrestrial on a stout peduncle six inches tall covered with loose stiff truncate leaves an inch and a half long, above densely floriferous, inflorescence 6 to 18 inches tall, outer bracts ovate acute dry, ribbed one inch long,  $\frac{1}{2}$  inch wide. Inner bract utricular nearly as long, enclosing a single flower, six-lobed, and split nearly to the base on the inner face, lobes  $\frac{1}{8}$  inch long acute. Calyx utricular longer than the corolla tube and shorter than the inner bract, 3 lobed lobes rounded obtuse. Corolla tube short and thick, lower lobes oblong obtuse thin punctate posticous one much broader rounded at the apex. Lip about as long, the claw broad, blade fan-shaped rounded buff yellow with red veins. Staminodes linear flat apex rounded. Stamen filament broad and thin three-veined rather short, anther cells thick linear, crest ovate rounded with curved linear lateral arms, Style longer, stigma funnel-shaped. Capsule oblong, fusiform one inch long. Seeds numerous black small.

Perak Hills. Maxwell's Hill. (Curtis 2714; Ridley 5190):  
Gunong Batu Puteh (Wray 1013).

#### COSTUS.

This genus has its headquarters in South America, and a number of species occur also in Africa. In Asia it is much rarer, though one species *C. speciosus* perhaps the finest in the whole genus occurs over the whole of tropical Asia. Two other species occur in the peninsula. It is one of the best marked genera in the whole order. The stems are tall and woody with the leaves arranged in a spiral, and in some species the stem itself grows spirally. Unlike any other genus except the allied *Tapeinocheilus* from New Guinea, the stems frequently branch. The ligule of the leaf forms a complete ring highest at a point nearest to the petiole, below which is sometimes a thin elevated ring fringed with hairs. The spike is terminal or rises directly from the rhizome with stiff sometimes spiny bracts. The calyx is tubular with usually distinct lobes. The corolla tube broad and no longer than the calyx, the lobes large lanceolate or oblong. There are no staminodes, nor stylodes. The lip is large obovate, and rolled into a trumpet shape.

The stamen is very broad and thin with the linear anther cells placed some way down and the apex curved up. The capsule is woody splitting on one side exposing a number of black angular seeds.

*Costus speciosus* Smith. Trans. Linn. Soc. i. 249. Bak. l.c. 250.

*C. arabicus* Jacq. Ic. t. i. *Hellenia grandiflora* Retz. Observ. VI  
68. *Banksia speciosa* Koen. Retz. Obs. iii. 75.

Stems about 10 feet tall and  $\frac{1}{2}$  to one inch through covered with dull brown sheaths, often spiral, branched above. Leaves oblong acuminate cuspidate 9 inches long, 3 inches wide above dark green glabrous, beneath more or less pubescent, petiole  $\frac{1}{4}$  inch long thick pubescent, ligule short surrounding the stem emarginate opposite the leaf ciliate reddish. Spike ovate or oblong terminal, very rarely from the rhizome attaining a length of six inches, many flowered, flowers solitary in the bracts large showy and fugacious. Bracts, ovate mucronate not pungent red  $\frac{3}{4}$  inch long, upper ones smaller cartilaginous. Inner

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bract  $\frac{1}{2}$  an inch long lanceolate acute keeled. Calyx short cartilaginous red, lobes very short, the two upper ones mucronate keeled, the lower one longer lanceolate not keeled, nor mucronate. Corolla tube very short hardly  $\frac{1}{4}$  inch long lobes equal, mucronate 2 inches long and one across, white sometimes tinted with rose. Lip very large obovate convolute 4 inches long and as wide, white with a central yellow bar, and an orange spot at the entrance to the tube, the centre hispid. Stamen 2 inches long, the filament broad oblong thin  $\frac{1}{2}$  an inch wide, hairy on the back, connective prolonged into an oblong acuminate upcurved crest, orange beneath. Anther narrow linear  $\frac{1}{2}$  an inch long. Style rather stout 2 inches long glabrous. Stigma transversely oblong quadrate, slit narrow subterminal. Ovary glabrous three-angled red three-celled. Capsule coriaceous oblong red crowned with the persistent calyx  $\frac{1}{2}$  an inch long each cell splitting longitudinally. Seed angled black about  $\frac{1}{8}$  inch long 4 or 5 in each cell.

Var. *argyrophyllus* Wall. Cat. 6555. Baker l.c. 250.

A more slender woodland form with more branched pubescent stems, leaves pubescent at the back, bracts and calyx less brightly colored, often plain green, flower spikes much smaller, lip smaller with no yellow spot in the mouth, petals often tinted pink. This variety keeps true under cultivation, but is hardly distinct enough to constitute a separate species.

Another variation I have once met with bore the flower spike on the rhizome instead of on the end of the leafy stem.

I have also seen a form of otherwise typical *C. speciosus* with no yellow on the lip, and forms occur in which the flower is more or less tinted with pink.

The common form occurs in damp open places, the var. *argyrophyllus* in denser woods.

Singapore abundant, Johore, Tanjong Kupang; Tenggara (Feilding), Malacca, common, var. *argyrophyllus* at Lubok Kedondong, and Jasin, Ophir; and Sungei Hudang. Sungei Ujong. Bukit Tampin. Selangor, Kwala Lumpur, etc. Pahang, Tahan river, Chengel. Perak, Hermitage Hill (var. *argyrophyllus*) Penang. This is the plant known as Stawa or Tawar by the Malays. It is used in various ceremonies.

*C. globosus* Bl. Enum. Pl. Jav. 62.

Stems tall rather slender woody 6 to 8 feet high, bases covered with thin reddish brown sheaths. Leaves on one side of the stem only, sheaths about an inch long terete, ligule annular apex fimbriate with hairs, petiole short  $\frac{1}{4}$  inch long thick, blade broadly oblanceolate acuminate thin, 7 inches long by  $2\frac{1}{2}$  inches across dark green above lighter beneath, nerves above conspicuous with transverse reticulations glabrous above, midrib pubescent or not. Spike from the rhizome on a short thick woody horizontal or ascending peduncle 3 inches long and half an inch thick, compact many flowered three inches long and half an inch thick, prickly from the sharp points of the bracts. Bracts stiff cartilagineous broadly ovate with a sharp stiff mucro half an inch long striate red covered with short blunt processes, an inch long including the point. Flowers solitary in the bract, large and showy, but fugacious, cherry red. Bracteole like the bract but inequilateral and smaller. Calyx tubular cartilaginous with three equal pungent mucronate lobes an inch in length pubescent red. Corolla tube as long as the calyx lobes thin pubescent lanceolate acute mucronate an inch long  $\frac{1}{2}$  an inch wide. Lip very large and thin obovate involute nearly two inches long fringed with hairs. Stamen filament broad thin  $\frac{3}{8}$  inch across, connective oblong much wider than the anther, crest ovate obtuse recurved red, back of stamen covered with white wool, anther  $\frac{1}{2}$  an inch long oblong white. Style slender thickened upwards. Stigma transversely oblong, slit transverse.

Rocks and banks in wet woods.

Singapore, Bukit Timah. Johore, Gunong Panti. Selangor, Petaling, Gua Batu. Perak, Maxwell's Hill. Pahang, Tahan river. Sungei Ujong, Bukit Tampin; Perhentian Tinggi. A native also of Java.

*C. Kingii* Baker. Flor. Brit. Ind. l.c. 250.

Stem about six feet tall slender. Leaves oblanceolate oblong cuspidate, 8 inches long by 3 wide glabrous above, softly pubescent beneath, sheaths 2 inches long hispid ribbed, ligule hardly distinct with no long hairs on the edge. Spike from the rhizome on a long, stout peduncle over 2 inches long, conical cylindric,



three inches long by 2 through. Bracts ovate about  $\frac{3}{4}$  inch long, upper ones smaller lancolate, mucronate, with a short point, covered with hair-like processes. Bracteole similar but smaller. Flowers solitary in the bracts, large and showy orange yellow. Calyx nearly one inch long tubular with three equal mucronate points hairy. Corolla tube 6 inches long wide, lobes oblong mucronate, pubescent. Lip convolute obovate 3 inches long and 2 inches wide. Stamen filament oblong rather short white woolly, tip rounded orange.

Penang, Pulau Butong (Curtis. 1976) Balik Pulau, fl. July. Perak, Larut Hills (King's Collector).

This is very near *C. globosus* Bl. but is distinguished by its pubescent leaves, narrower more hairy bracts, with less long and sharp points, and orange yellow flowers. The flowers are about three inches long. The lip is not so wide as that of *globosus* and is edged with hairs.

#### ZINGIBER.

This genus is very well marked by the curious prolonged point of the anther which occurs in no other genus here. The plants are all comparatively small, the stems being one or two feet tall, with the exception of one or two kinds which attain a height of six feet. The rhizome is usually thick and more or less aromatic. The spikes rise directly from the rhizome in all our species but abnormal forms occur in which they are borne on the ends of the leafy stems. I have seen this in the cultivated ginger *Z. officinale* L. and in a plant allied to if not identical with *Z. gracile*. The spikes are cylindrical or conical, with large broad red or yellow bracts, in each of which are one or more flowers. These are yellowish white, sometimes spotted with pink or mottled with black, one or two only open at a time and they last but a day. The calyx is tubular and short. The corolla tube projects but little beyond the bract, and the lobes are lanceolate or oblong. The lip is three lobed, the side lobes are turned up and I believe are really the staminodes which are joined to the true lip by their lower edges. The stamen is narrow and prolonged at the top into a long curved beak, which almost touches the lip over which it is curved. The style runs to the end of this beak. The fruit is a thin walled

capsule transparent and white and almost hidden in the bracts. When ripe it splits into its three segments and shows the black angled seed covered with a very thin white aril.

The Zingibers inhabit dense jungles, but two cultivated species can be found in waste ground near villages.

*Z. Zerumbet* Sm. Exot. Bot. ii. 105 t. 112. *Z. spurium* Koenig. Retz observ. iii. 60.

Rhizome fleshy yellow inside, white when old, bitter at first aromatic. Stems short and stout about 1—1½ foot high. Leaves crowded broadly lanceolate glabrous 4 to 6 inches long, 2½ to 3 inches wide, glabrous above with hairs on the midrib beneath ligule ½ an inch long papery brown. Spike globose to oblong 3 inches long, blunt on a stout peduncle covered with sheaths 3—4 inches long. Bracts broad rounded at first green eventually red, edges paler and hairy. Calyx spathaceous half an inch long, white. Corolla tube graceful twice as long, white, lobes lanceolate acute. Lip broad and short lateral lobes rounded, median orbicular to subovate retuse, pale yellow with an orange central bar, sometimes faintly mottled pink. Stamen short. Capsule oblong cartilaginous white splitting in 3 seeds oblong black ribbed covered by thin sweet aril.

Common in orchards and round villages, Singapore, Malacca, Selangor. The Lampoyang of the Malays used in native medicine.

*Z. officinalis* Rosc. The true ginger of commerce is cultivated here but never establishes itself as *Z. Zerumbet* does. It is known as Haliya. The leaves are narrow, the stems short. The spike which I have seen borne on the end of the leafy stem, is usually borne directly on the root stock. It is green with mottled black and yellow flowers, rarely however produced, and the fruit has never yet been seen. It is not known to occur wild anywhere.

*Z. Kunstleri* King. ms.

A herbaceous plant more like a shrub 4 to 6 feet high. Leaves lanceolate acuminate more than a foot long and three inches wide narrowed at base but not distinctly petioled, ligule very short. Flowering stem over a foot tall rather stout cov-

ered with sheathing leaves upper ones larger and uppermost with an ovate blade 2 inches long and one across. Spike short and broad (a capitulum) about three inches long and through. Bracts lanceolate apices deflexed. Flowers shortly protruding. Corolla tube slender, terete, lobes narrow lanceolate acute. Lip narrow shorter than the lobes, lanceolate acute, lateral lobes indistinct, hardly elevated. Anther longer than the lip, cells narrowly oblong, beak about as long as the cells narrow. Perak, open old jungle, rich rocky soil, 2000 to 2500 feet, August 1884. Flower-stem a rich light brown and pink. Flower pale white reddish and brown inside. (Kunstler, No. 2219).

I have never seen this plant, and take the description from a drawing and notes by Kunstler. It is a very striking and distinct plant in its round dense head of flowers and broad bract-like sheathing leaves just beneath it. The narrow lip distinctly shorter than the petals, and showing no large lateral lobes as in other species is also quite peculiar.

*Z. spectabile* Griff. Notulæ. iii. 413.

A very large noble species, with stout stems 7 feet tall,  $\frac{1}{2}$  an inch through, glabrous slightly flattened. Leaves about 25, rather thin textured lanceolate mucronate subdistichous a foot long, 4 inches across dull green above, paler beneath, ligule thin rounded bilobed  $\frac{1}{4}$  inch long. Scapes stout a foot long or more, covered with green sheaths, and bearing a showy spike a foot long. Bracts stiff ovate cartilaginous edges recurved, blunt, an inch long at first yellow then becoming scarlet. Flowers solitary in the bracts. Calyx spathaceous subobtusely shortly split  $1\frac{1}{2}$  inch long striate white. Corolla tube  $1\frac{1}{2}$  inch long, lobes lanceolate acute, upper one  $1\frac{1}{2}$  inch long,  $\frac{1}{2}$  inch across, lower ones narrower connate for half their length and adnate to the lip. All yellowish white. Lip 3 lobed broad a little shorter than the petals, lateral lobes broad rounded, median ovate bifid shortly at the apex, base and middle of lip thickened grooved, lemon yellow mottled with deep purple nearly black at the tip. Anther broad fleshy ocre yellow, appendage long curved acute purple. Stigma elliptic fringed all round with transparent processes. Capsule one inch long fleshy. Seed black with a white aril.

Malacca, Panchur. Negri Sembilan, Bukit Tampin. Selangor, Petaling, Gaves, Kwala Lumpur. Pahang, Kwala Luit; Tahan (2407) Perak, Larut. King's collector (3205). Dindings at Lumut. Penang, Pulau Butong (Curtis 1978.)

The largest and grandest species known and well worthy of its specific name. The large showy spikes at first bright yellow then becoming brilliant red, with the strange black and yellow flowers make it a plant well worth cultivating.

*Z. chrysostachys* n. sp.

Stems graceful slender about 2 feet tall,  $\frac{1}{8}$  inch thick purplish, leaves about ten rather distant lanceolate acuminate dark green, thin textured 5 inches long and  $1\frac{1}{2}$  inch broad shortly petioled, ligule inch long oblong. Scapes about six inches tall with a peduncle 2 inches high, rather stout and covered with red sheaths. Spikes four inches long oblong, with broad truncate retuse bracts bright yellow. Flowers solitary. Corolla tube short white, lobes lanceolate acute one inch long white. Lip with a narrow linear base three lobed about as long as the petals lateral lobes ovate obtuse white, median lobe and disc between the lateral lobes white but mottled and marbled almost all over with crimson, apex shortly bifid. Stamen, filament linear, anther cells elliptic but little narrower than the connective. Beak curved acute thickly spotted with pink.

Perak on Maxwell's Hill about half way up (5199). (Curtis 2716.) (Wray 3549.)

*Z. citrinum* n. sp.

Stems stout one foot tall. Leaves dark green pubescent beneath broadly lanceolate subacute with the chief veins prominent, 8 inches long and four inches wide, petiole short or none, ligule very short rounded. Spike oblong blunt 4 or 5 inches long on a stout green peduncle 3 inches long. Bracts broad rounded bright lemon yellow, becoming dull pink in fruit. Calyx dilated transparent white subacute apex bifid  $\frac{3}{4}$  inch long. Corolla tube graceful  $2\frac{1}{2}$  inch long yellow. Dorsal petal lanceolate subacute apex incurved yellowish, laterals connate and adnate to the lip for two thirds of their length,  $\frac{3}{4}$  inch long. Lip

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shorter than corolla lateral lobes large oblong rounded, median lanceolate obtuse, yellow. Stamen long beak acute, anther cells grey, pollen flesh colour.

Selangor, Ginting Peras, Ginting Bidai, and Dusun Tua (7797). Perak, Ulu Bubong. (King 10263).

*Z. gracile* Jack. Malay Miscell. i. No. 1. Bak. Fl. Brit. Ind. l.c. 246.

Stems slender 2 feet or more tall. Leaves ovate to ovate lanceolate acute six inches long  $2\frac{1}{2}$  broad light green paler and pubescent beneath, ligule short. Spikes cylindric acute at the apex and tapering into the peduncle 4 to 6 inches long, peduncle 6 to 12 inches long. Bracts pink, ovate broad blunt or acute about an inch long. Flowers thin yellowish white. Calyx very thin semitransparent, lobes long lanceolate acute. Corolla tube an inch long, lobes lanceolate acute as long, upper one a little broader. Lip lateral lobes oblong rounded  $\frac{1}{2}$  an inch long, mid lobe shorter than petals narrow deeply bifid lobes acute, narrow. Stamen filament short, anther elliptic beak long curved. Capsule  $\frac{1}{2}$  inch long elliptic. Seeds 2 or three, ovoid black flat in front rounded behind  $\frac{1}{4}$  inch long.

Singapore, Bukit Timah. Malacca, Sungei Hudang, Mt. Ophir. Pahang, Tembeling; Tahan. Selangor, Kwala Lumpur; Bukit Hitam. Penang.

*Var. elatior.*

A very much taller slenderer plant with stems about five feet tall, leaves narrow linear lanceolate acuminate 10 inches by 1, peduncle 18 inches and spike 7 or 8.

Hills at 2000 feet or upwards. Penang Hill. Perak, Maxwell's Hill.

King No. 7954. Possibly a distinct species.

*Z. puberula*. n. sp.

Stems 6 to 8 feet tall with numerous leaves, about  $\frac{1}{2}$  an inch thick. Leaves oblong elliptic acuminate, a foot long  $3\frac{1}{4}$  inch across, above deep green, glabrous, beneath paler covered especially on the stout midrib with brownish fur, petiole thickened  $\frac{1}{4}$  inch long, broad, thickly covered with brown wool, ligule ovate bilobed, lobes blunt  $\frac{3}{8}$  inch long and like the sheath covered with brown wool. Spikes numerous fusiform acute pink 3 to 6 inches

long with an equally long peduncle  $\frac{3}{4}$  inch thick. Bracts ovate obtuse pubescent margined with brown fur. Inner bract lanceolate acute semitransparent white over  $\frac{1}{2}$  an inch long, inch across. Calyx spathaceous one inch long shortly split apex truncate white. Corolla tube 2 inches long projecting beyond the bract  $\frac{1}{8}$  inch through, white, lobes thin creamy yellow lanceolate acute an inch long, dorsal  $\frac{1}{4}$  inch across, laterals narrower and connate for a quarter of their length and adnate to the lip. Lip shorter than the petals, three-lobed, lateral lobes oblong rounded, median longer oblong blunt all creamy white with yellower points (rarely bright canary yellow). Anther narrowly oblong  $\frac{1}{2}$  an inch long brownish red, pollen creamy white, beak  $\frac{1}{2}$  inch long yellow. Stigma transverse narrow, edged all round with rather long processes.

Singapore, common, Serangoon Road, (No. 4613) Bajau, Bukit Timah, Johor, Tanjong Kupang. Selangor, Ginting Bidai (No. 7798).

This is closely allied to *Z. gracile* and *Z. Griffithii* but is a very much bigger plant than either, and is very distinct in the pubescence of its leaves and bracts, and its long corolla tube. A plant cultivated in the Botanic gardens bore canary yellow flowers with the midlobe of the lip longer than usual and oblong. It also produced a spike on a peduncle 7 inches long covered with long pubescent sheaths at the base of the spike. The sheaths passed into narrowly oblong pubescent bracts, longitudinally striped red and green, and three of the upper ones bore ovate lanceolate blades half an inch long and  $\frac{1}{4}$  inch wide.

*Z. Griffithii* Baker l.c. 246.

Stems about three feet tall,  $\frac{1}{4}$  inch through slightly compressed striate. Leaves elliptic acuminate 8 inches long, 3 inches across glabrous deep green above paler pubescent beneath, sheaths split to the base pubescent, ligule  $\frac{1}{8}$  inch long rounded deeply emarginate brown pubescent, petiole thick nearly  $\frac{1}{4}$  inch long. Spikes fusiform 4 or 5 inches long on a stout peduncle 3 inches long, finely pubescent pink. Bracts broadly ovate one inch long and as broad. Flowers solitary yellowish white. Calyx very thin spathaceous  $\frac{1}{2}$  an inch long. Corolla tube one inch long, lobes lanceolate acute  $\frac{3}{4}$  inch long, lower ones connate

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for about  $\frac{1}{2}$  their length. Lip a little shorter, lateral lobes rounded, median lanceolate acute. Anther oblong brown, beak curved yellow. Stigma transverse fringed all round with hairs.

Singapore, Bukit Timah, etc. common. Johore, Bukit Tanah Abang; Batu Pahat (Kelsall). Malacca, Bukit Sadanen (1434 Goodenough). Perak, Tanjong Hantu; Bruas (Dindings No. 7224); Pahang, Tahan River.

*Var. major.*

A very much larger plant than usual; leaves elliptic oblong acuminate  $1\frac{1}{2}$  foot long, 5 inches across; sheaths glabrous, petiole almost wanting. Spike glabrous, thick with broad bracts, Flower 3 inches long. Corolla tube 2 inches.

Pahang, Kwala Tembeling. Perak, Bujong Malacca (No. 9820). A very large and stout plant, about five feet tall, with thick stems broad stiff leaves and much larger flowers. Perhaps a distinct species but the form of the flowers seems to me the same.

### AMOMUM.

This genus has been used to include a large number of very different plants, but I would propose to retain it for those only which were included under the section *Eu-amomum* of Benth. Thus restricted, the Amomums are plants with leafy stems from two to 6 feet tall, the inflorescence a short dense obconic spike rising on a short peduncle from the root stock. The bracts lanceolate or ovate, containing one or more flowers enclosed in thin bracteoles. Calyx tube as long as the corolla tube, the corolla lobes oblong or lanceolate. Staminodes absent. Lip large, often very large, and convolute. Stamen broad, with a rounded crest, and two horn-like or linear processes projecting from the upper angles. The style shorter than the crest. The fruit usually a succulent capsule, often covered with processes, and containing a large number of seeds.

This excludes from the genus as described in the Flora of British India, the genera *Hornstedtia* (*Achasma* and *Stenochasma*), *Phæomeria* and *Cenolophon*, and besides several other species such as *Amonum biflorum* Jack. (an *Ellettariopsis*) which appears to have got in by mistake.

*A. Zanthophlebium* Bak. l.c. 241. *A. stenoglossum* Bak. p. 234.

Stems six feet tall  $\frac{1}{2}$  inch through. Leaves two feet or more in length, two to four inches wide oblong lanceolate with a long cusp, glabrous, petiole stout about an inch long ligule short truncate  $\frac{1}{4}$  inch long pubescent. Spikes several on a plant, loose obconic six inches long or usually less on subterranean peduncles, stout 4 to 6 inches long covered with sheaths. Bracts oblong glabrous about 2 inches long and one inch across spreading, rather stiff cherry red. Bracteoles spathaceous keeled three lobed, lobes unequal dull pink. Flowers solitary. Calyx one inch long split to the base on one side 3-lobed, lobes unequal deeply cleft blunt pubescent, brownish pink. Corolla tube thick  $1\frac{1}{2}$  inch long, lobes unequal, upper one broad ovate obtuse  $\frac{1}{2}$  an inch wide, laterals narrowly oblong obtuse  $\frac{1}{4}$  inch across, cherry red. Lip convolute entire little longer than the petals, obovate apex rounded yellow densely marked with red streaks, and spots. Stamen filament linear broad white with a red base anther  $\frac{1}{2}$  an inch long linear yellow, cells parallel linear, pollen white, connective prolonged into a short rounded entire crest behind the stigma, and into two curved linear horns from the upper angles of the anther, yellowish tipped red. Style fusiform, stigma cup-shaped ocreous. Stylodia in the form of a short lobed disc almost surrounding the style. Capsule elliptic oblong finely pubescent, an inch long. Seeds numerous small black. Hab. dense damp jungles, flowering in May and June.

Singapore, Bukit Timah, Bukit Panjang, etc. Malacca (Main-gay), Perak. Larut 500-1000 feet (King 1957), Bujong Malacca at 3000 feet elevation.

I have examined the plant on which *A. Stenoglossum* Bak. was based and find the stamen exactly the same as that of *A. Xanthophlebium*, and not crestless, as described.

*A. flavum* n. sp.

Stems tall and stout 12 to 15 feet pubescent. Leaves a foot long and 2 inches wide oblong lanceolate with a long point pubescent beneath, petiole very short, ligule truncate, as long. Spikes several borne on branches of the rhizome covered with ovate sheathing leaves  $\frac{1}{2}$  to one inch long, peduncle  $1\frac{1}{2}$  inch long. Spikes subglobose about an inch long and  $2\frac{1}{2}$  inch across, com-



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pact. Bracts ovate mucronate brown. Bracteole spathaceous pubescent bilobed,  $\frac{1}{2}$  inch long, lobes mucronate. Calyx pubescent  $1\frac{1}{2}$  inch long, tubular split down the back bilobed, lobes mucronate. Corolla tube as long, lobes ochreous upper one obovate hooded  $1\frac{1}{2}$  inch long, laterals narrower oblong lanceolate Lip large, one inch across convolute obovate, margins recurved ribbed, yellow spotted with red in the centre. Stamen filament straight rather broad pale orange, anther narrow linear yellow. Crest reniform apices rounded with a short central projection,  $\frac{1}{4}$  inch wide veined orange. Style shorter than the crest. Stigma cup-shaped.

Penang, Waterfall Gardens (Curtis 2275), Penara Bukit (7226). Sumatra, Lampongs, (H. O. Forbes).

Allied to *A. Xanthophlebium* Bak. but with smaller orange flowers brown ovate bracts and a very different crest.

## *A. lappaceum* n. sp.

Rhizome stout. Stems tall and stout about 6 feet or even more. Leaves oblong lanceolate acuminate cuspidate somewhat narrowed at the base glabrous, not petioled, 18 inches long by four wide. Spikes numerous gradually elongating to 16 inches in length, cylindrical, rachis stout covered with brown tomentum. Flowers numerous shortly pedicelled ( $\frac{1}{4}$  inch). Bracts oblong bifid at apex, points rounded, red,  $1\frac{1}{2}$  inch long, 1 inch wide. Bracteole tubular  $\frac{1}{2}$  inch long trifid, apices pink. Calyx tubular one inch long trifid apices acute equal, red. Corolla tube as long as the calyx, lobes linear upper one broader, oblong about half an inch long ochre yellow. Lip obovate rounded shortly bilobed. Staminodes none. Stamen rather short, anther  $\frac{1}{2}$  an inch long, crest none. Ovary pubescent. Fruit oblong  $\frac{3}{4}$  inch long covered with conic subulate spines, pedicels  $\frac{1}{2}$  an inch long stout.

Dense woods, Selangor, Ginting Peras (7802). Perak (Scortechini 222) Wray; Maxwell's Hill, Ridley.

The most peculiar thing about this plant is the way in which the flower spikes gradually lengthen as the flowers open till they attain a length of 18 inches, and the pedicels which in the flower are about  $\frac{1}{4}$  inch long become twice that length. The fruit is eaten by Sakais.

*A. ochreum* n. sp.

Stems tall and stout. Leaves oblong 3 feet long and 7 inches wide apex broad cuspidate glabrous, petiole hardly distinct very thick  $\frac{1}{2}$  inch long ligule oblong obtuse. Spike short globose elongating in fruit, peduncle  $1\frac{1}{2}$  inch long. Bracts lanceolate  $1\frac{1}{2}$  inch long thin. Bracteole tubular  $\frac{1}{2}$  inch long edge hairy. Flowers large yellow. Calyx as long as corolla, tube 1 inch long lobes lanceolate subobtuse 3-nerved tipped with hairs. Corolla tube thick lobes oblong obtuse  $\frac{3}{4}$  inch long dorsal wide hooded. Lip very large over an inch long rounded convolute, yellow edge denticulate. Anther oblong  $\frac{1}{2}$  an inch. Fruit large globose green succulent covered with short processes.

Selangor, Ginting Bidai.

*A. perakense* n. sp.

Rhizome stout woody with numerous stiff woody roots. Stems slender about  $\frac{1}{4}$  inch through. Leaves narrow lanceolate acuminate with a long point base narrowed, petiole hardly distinct, 8 inches long one inch broad, ligule very small. Scapes several peduncles 2 inches long flexuous. Spike about as long rather narrow subcylindric. Bracts narrow oblong caducous  $\frac{3}{4}$  inch long. Bracteole oblong obtuse flat. Calyx tube half an inch long dilated upwards three-lobed lobes lanceolate acute. Corolla tube slender barely longer than the calyx upper one largest  $\frac{3}{8}$  inch long. Lip obovate longer than the corolla. Staminodes longer than the filament base linear apex setaceous, Stamen anther long narrow  $\frac{1}{4}$  inch long, crest rounded distinct, filament short. Stigma obconic.

Perak. Maxwell's Hill. June 1893.

I have only collected this once and describe it from dry specimens. It is remarkable for its woody rhizome raised above ground, with stiff woody roots, like that of a *Geostachys* and its lengthening spike, of which the bracts fall off as it develops, leaving a bare rachis only bearing the short pedicels. In its large staminodes and small flowers it resembles *Z. macrodon* Scott.

*A. testaceum* n. sp.

Stems about 12 feet tall, clubbed at the base, stout. Leaves

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lanceolate cuspidate gradually narrowed to the base over 2 feet long and 4 inches wide glabrous; ligule very short. Spikes several cylindric or fusiform 3 to 4 inches long on peduncles 6 inches long covered with green sheaths. Bracts papery striate and pale brown oblong subacute  $1\frac{1}{2}$  inch long  $\frac{1}{2}$  an inch wide silkily pubescent. Bracteoles tubular fawn-color, two lobed, silky  $\frac{1}{2}$  an inch long. Calyx fawn-colored three-lobed, lobes rounded silky. Corolla tube barely longer, lobes linear oblong, white blunt  $\frac{1}{2}$  inch long. Lip spoon-shaped entire, little longer than the petals white apex yellow, with a short carmine line at the base on each side, central bar thickened. Staminodes oblong truncate, buff. Stamen filament broad, broader than the anther, anther short thick and quadrate upper angles produced oblong obtuse, crest entire oblong blunt recurved. Style thickened upwards above the anther. Stigma very large oblong, much bigger than the crest, ovary silky.

Selangor, Caves Kwala Lumpur (8173) Pulau Tioman.

A dull colored plant with pale fawn colored bracts and inconspicuous white flowers. It flowers in December.

*A. cylindraceum* n. sp.

Stems six feet tall, Leaves oblong lanceolate acute narrowed at base, grey-green, 18 inches long by 2 wide glabrous closely veined, with a stout keel, petiole none, ligule very large  $\frac{1}{2}$  inch long bifid lobes acute. Spikes cylindrical stout 6 inches long, on strong peduncles of equal length, covered with rufoustomentum and with large oblong sheaths an inch long. Bracts ovate oblong stiff brown. Bracteole  $\frac{1}{2}$  inch long truncate bifid, tubular. Calyx tubular  $\frac{3}{4}$  inch long truncate pubescent. Corolla tube an inch long slender pubescent, lobes oblong obtuse the upper one hooded, orange. Lip three-lobed, lobes rounded darker orange. Staminodes lanceolate acuminate. Anther crest oblong with two points at the side. Fruit globose rough, with numerous low ribs about  $\frac{1}{2}$  inch long brown.

Dindings, Woods at Telok Sera.

Flowers in January, fruit in March. This is allied to *A. testaceum* in its cylindrical spike and small flowers.

*A. uliginosum* Koen. Retz. Obs. iii. 56. Baker. l. c. 247.

Rhizome with very long cylindrical branches about  $\frac{1}{4}$  inch

through covered closely with brown sheaths. Stems about 5 feet tall or less. Leaves narrowly lanceolate narrowed to the base long-cuspidate one foot long, 1 inch wide, petiole very short or absent, ligule  $\frac{1}{2}$  inch long rounded. Spikes usually distant from the stems on a branch of the rhizome, obconic, peduncled, peduncle 1 to 4 inches long covered with sheaths. Bracts elliptic ovate pink or brown. Calyx tubular pink  $\frac{1}{2}$  an inch long, lobes narrow acute. Corolla tube a little longer, lobes linear acute narrow rosy. Lip boat-shaped narrowed at the base geniculate at the extreme base, with thickened deep maroon knees, white with a median yellow bar, a crimson line on each side of it and a few crimson spots at the base,  $\frac{1}{2}$  an inch long. Stamen shorter than lip incurved, filament rather broad white, anther oblong, crest three-lobed, lobes squared, the centre one retuse. Stigma club-shaped. Fruit globose covered with soft red processes,  $\frac{1}{2}$  an inch through.

Malacca, Bukit Sedanen (Derry 238). Sungei Ujong, Bukit Tampin. Pahang, Kwala Tembeling, Kota Glanggi, etc. (2404). Perak, Lumut. Dindings. Penang, Balik Pulau. Kedah, Yan.

This inhabits woods and banks, where its long branching rhizomes may be seen creeping for some distance.

It is said by Derry to be planted by the Jakuns for its eatable fruit and it is known to the Malays as Pua Hijau, Pua Gajah, and Tepus Merah. Its boat-shaped white lip with a yellow bar edged with pink and round red fruit covered with processes like those on a Rambutan make it easily recognized.

Koenig collected the type of *A. uliginosum* at Raput Nok in Junk Ceylon, and his description applies very well to this plant which I have found as far north as Kedah. He describes the crest however 4 lobed, perhaps counting the retuse central lobe as two lobes.

*A. hastilabium*. n. sp.

Rhizome aromatic rather slender woody. Stem 3 or 4 feet tall rather stout glabrous. Leaves oblong lanceolate acuminate at both ends glabrous, drying grey, 9 to 18 inches long and 2 to 4 across, petiole  $\frac{1}{2}$  an inch long ligule ovate rounded  $\frac{1}{2}$  inch. Spike short obconic compact 1 - 2 inches tall on a stout peduncle

an inch long. Bracts ovate lanceolate ribbed stiffly papery, light brown, mucronate, an inch long  $\frac{1}{2}$  an inch wide. Bracteole lanceolate acute longer than the calyx. Flowers open two at a time. Calyx tube  $\frac{3}{4}$  inch long cylindric truncate white narrowed at the base dilate above, deeply split in front. Corolla tube an inch long slender terete, lobes oblong blunt white  $\frac{1}{2}$  inch long, ribbed. Lip broadly hastate, with a narrow linear base, lateral lobes rounded thin white, midlobe narrow oblong obtuse orange central bar dark orange with purple marks at the sides; one inch long and wide. Staminodes lanceolate acuminate apex setaceous white. Stamen filament broad linear white, anther oblong linear, cells dark red, crest broad oblong truncate pale orange longer than the style. Fruit globose about  $\frac{1}{2}$  an inch long with strong ribs, hairy fawn-colored.

Singapore, Bukit Timah, Selitar. Johore, Gunong Panti, Selangor, Dusun Tua. Perak. Wray (3476).

Flowers in May. Perhaps as closely allied to *A. uliginosum* as to any of our species. The long corolla tube, and spade-shaped lip are unusual.

*A. micranthum* n. sp.

Rhizome creeping far slender with long woolly roots. Stems slender about 2 feet tall. Leaves narrow lanceolate acuminate, 6-7 inches long  $\frac{1}{4}$  inch wide dark green glabrous, petiole very short or none, ligule very short truncate. Spikes short, obconic dense, one inch long on peduncles of the same length. Bracts narrow lanceolate acute pubescent  $\frac{1}{4}$  inch long, brown. Flowers very small about half an inch long. Calyx a little shorter than the corolla tube, tubular with three short acute lobes, green. Corolla tube a little more than  $\frac{1}{4}$  inch long lobes narrow linear, pale yellow. Lip oblong dilated towards the apex, then suddenly narrowed and bifid, centre depressed, with a round nectary at the base, pale yellow dotted with pink. Staminodes short linear. Stamen filament tapering upwards, and anther small oblong, with the upper angles produced into acute curved processes, and a small entire rounded crest. Style very slender. Fruit small globular purple brown covered with soft processes.

Penang Hill, in several places but not common. (Curtis 2884.) Negri Sembilan on Gunong Angsi.

Distinct in its narrow grassy leaves, and very small flowers.

*A. macrodus* Scott. Nuov. Giorn. Bot. Ital. xviii 309 from the Kinta Valley, Perak, has well developed staminodes, and a simple anther crest. It is perhaps a *Gastrochilus*. I have never met with it.

#### HORNSTEDTIA.

This genus was founded by Retz (Observationes iii.) on the two common species of the peninsula *H. scyphus* and *H. Leonurus*. Later Blume described some species under the name of *Donacodes*, others he referred to the genus *Elettaria*. Griffith overlooking Retz' work, made two genera *Stenochasma* and *Achasma*, and finally they were all placed under *Amomum* by Benthams and Hooker, who was followed by Baker. I propose to restore Retz' genus and to include also under it the beautiful plants classed as *Phæomeria* Lindl. and *Nicolaia* Horan. The genus thus may be described. Plants with tall rarely short leafy stems, often 12 to 15 feet tall. Leaves numerous oblong petioled. Spikes radical on short or long peduncles, with large outer bracts usually red, ovate or oblong, forming a cup or spreading. Bracteoles thin tubular. Flowers sessile numerous. Calyx spathaceous thin. Corolla long or short-tubed, lobes oblong narrow not spreading. Lip narrow often long, linear or narrowly oblong, the sides at the base convolute over the stamen. Stamen short and thick, anther fleshy, bent at an angle with the filament, crest very small or none. Staminodes none. Capsule oblong with thin cartilaginous walls and numerous black seeds, or (section *Phæomeria*) sub-globose with a green fleshy pericarp and bony walls and brown angled seeds. Species about 20 known, scarce in India abundant in the Malay peninsula and the Western part of the Malay archipelago.

Section 1. *Eu-hornstedtia*. Spikes on very short peduncles buried in the ground. Tube of flowers very long, lip long. Fruit concealed in the persistent outer bracts, thin-walled oblong.

Section 2. *Phæomeria*. Spikes on tall peduncles, cone-shaped or cup-shaped. Tube of flowers and lip short. Fruit globose woody the outside green and fleshy, arranged in a ball, the bracts having disappeared.

To the former section besides those of the Malay peninsula belong *Alpinia linguiforme* Roxb. of India, and apparently from

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the description, *Elettaria foetens* Bl. *E. minuta*, *E. coccinea* and *E. minor* Bl. *E. pininga*, *E. rubra*, *E. paludosa*, *E. tomentosa*, Miq. all of Java, but the descriptions published of these are inadequate. To the section 2 belong *H. imperialis*, *H. Maingayi*, *H. venusta*, *H. hemisphaerica* of the Peninsula, *H. involucrata* (*Amonum involucratum* Benth.) of Ceylon, *H. Fenzlii* (*A. Fenzlii* Kurz.) of the Nicobars. *H. pallida* (*Elettaria pallida* Bl.) *H. macrocephala*, (*E. macrocephala* Miq.)

*H. scyphus* Retz. Observ. vi. 18. *Amonum scyphiferum* Koenig. Retz. Observ. iii. 68. Bak. l.c. 237, *Stenochasma urceolare* Griff. Notul. iii. 431.

Rhizome stout and woody, stems ten feet tall  $\frac{1}{2}$  an inch through. Leaves oblong base oblique, 2 feet long and six inches wide dark green and glabrous above, paler beneath and hairy along the midrib or all over, petiole  $\frac{1}{4}$  inch long, ligule oblong obtuse hairy, nearly half an inch long. Spike cylindric on a short stout peduncle, covered with oblong ovate bracts red, outer ones empty 2 inches long  $1\frac{1}{2}$  broad longitudinally and transversely ribbed, thick and stiff in texture. Bracteoles lorate lanceolate 2 inches long  $\frac{1}{4}$  inch wide, tips dark red with a scarious margin, minutely mucronate. Flowers solitary in the bracts opening one or two at a time,  $3\frac{1}{2}$  inch long. Calyx spathaceous an inch long three-lobed flattened red, lobes rounded red tipped with white. Corolla tube much longer slender red, the lobes lanceolate oblong, upper one hooded  $\frac{3}{4}$  inch long  $\frac{1}{4}$  wide, lower ones shorter adnate to the lip below for the greater part of their length, all deep shining red. Lip a little longer than the upper petal, side lobes rounded embracing the stamen, apex fleshy tongue-shaped dark red pubescent especially in the centre. Stamen filament short broad, anther cells linear grey, upper part only polliniferous lower part pubescent crest ovate rounded. Staminodes absent. Style slender white. Stigma red cup-shaped, terminal pubescent. Stylodes forming a tube round the base of the style with their tips free, half an inch long, ovary glabrous 3-celled, ovules numerous. Capsule oblong obscurely triangular  $\frac{3}{4}$  inch long,  $\frac{1}{4}$  inch through yellowish white, thinly cartilaginous. Seeds numerous black smooth truncate angled  $\frac{1}{16}$  inch long enclosed in an acid pulp.

Common in woods. Singapore very common. Johor, Tanjong Bunga. Selangor, Bukit Hitam; Petaling. Malacca. Also in Pulau Buru, South of Singapore. Mandan River, Siak, Sumatra and Penghulu Ampat. Sarawak (Haviland).

*H. Ophiuchus*. *Amomum ophiuchus* Ridl. Trans. Linn. Soc. l.c. p. 381.

Stems about 12 feet tall clubbed at the base. Leaves oblong lanceolate glabrous  $1\frac{1}{2}$  feet long 3 inches wide, petiole  $\frac{1}{2}$  an inch long, ligule ovate oblong obtuse pubescent. Spike fusiform 5 inches long. Bracts ovate or ovate lanceolate acute mucronate ribbed silky pubescent 2 inches long and one wide red. Flowers 5 inches long red. Calyx tubular 3 inches long acute silky below glabrous above. Corolla tube graceful, lobes lorate cucullate shining red. Lip as long lorate apex hooded fleshy red with white edges pubescent inside. Stamen anther oblong emarginate with no crest pubescent red. Style slender. Stigma pubescent clubbed, ovary silky.

Pahang, Tahan woods.

Allied to *H. Scyphus* but the bracts are narrower and more acute and have not the cross bars of that species.

*H. grandis* n. sp.

Rhizome stout elevated above the ground. Stems tall and stout swollen at the base. Leaves oblong cuspidate nearly 3 feet long and 6 inches across glabrous petiole  $\frac{1}{2}$  an inch pubescent ligule longer pubescent sheaths pubescent. Spikes elongate obconic cylindric 8 inches tall covered with ovate rounded bracts hispid on the edges and covered with transverse irregular elevations, the longitudinal ribs being rather obscure. Bracteoles narrow lanceolate. Calyx cylindric tubular 3 feet 2 inches long. Corolla tube nearly 5 inches long terete but dilated at the apex, upper lobe lanceolate obtuse one inch long, lower ones oblong lanceolate. Lip but little longer, lateral lobes little developed, apex rounded entire pubescent. Stamen filament  $\frac{1}{4}$  inch beyond the mouth of the corolla tube, anther  $\frac{1}{2}$  inch long, hairy, crest ovate acute. Style stout pubescent. Stigma cup-shaped pubescent, ovary glabrous. Stylodes an inch long narrow.

Perak, Maxwell's Hill. June 1893.

Nearly allied to *H. Scyphus* but much bigger in all its parts.



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*H. conica* n. sp.

Stems stout about five feet tall. Leaves oblong lanceolate cuspidate 2 feet long 3 - 4 inches wide glabrous above pubescent or glabrous beneath, drying red, petiole  $\frac{1}{2}$  to 1 inch long, glabrous or hispid, ligule large  $\frac{1}{2}$  an inch long, ribbed longitudinally and with small transverse bars. Spike four inches long, fusiform acuminate. Bracts ovate acute upper ones narrower and longer, pink covered with a fine silvery tomentum, longitudinally ribbed. Bracteoles thin narrow glabrous. Flowers purplish pink shortly protruded. Calyx tubular ending in a long point 2 inches in length, silky at the base. Corolla tube very slender twice as long, dilated a little above, lobes oblong obtuse  $\frac{1}{2}$  inch long, purple pink. Lip longer, tongue-shaped blunt.

Singapore, Bukit Panjang. Johor, Gunong Panti. Selangor, Bukit Hitam; Langat.

The flower spike in this species dilates from a narrow base and then tapers to a point from which the flowers protrude but a short way, little more than an inch. The very long slender corolla tube and short entire lip are also peculiar points, it is allied to *H. ophiuchus*.

*H. Leonurus*. Retz. Observ. vi. 18. *Amomum Leonurus* Koen. Retz. observ. iii. 69. *Stenochama convolutum* Griff. Not. iii 433. *Amomum Ridleyi* Bak. Kew Bulletin 1892. 127.

Stems about 12 feet tall bearing about 20 leaves, Leaves oblong acuminate base truncate glabrous, polished dark green above a foot and a half long, and  $4\frac{1}{2}$  inches across petiole one inch long, ligule entire rounded blunt  $\frac{3}{8}$  inch long. Spike cylindric 3 inches long almost buried. Bracts lanceolate acute minutely silvery pubescent  $2\frac{1}{2}$  inch long and  $\frac{3}{4}$  inch wide. Flowers in pairs. Calyx tubular spathaceous split almost the whole way down on one side, apex entire 3 inches long. Corolla tube slender gradually enlarged upwards 3 inches long lobes linear oblong hooded, the upper one  $\frac{1}{4}$  inch across, the others not connate much narrower, red, one inch long. Lip hastate blunt, sides upcurved, apex longer fleshy, red, as long as the corolla. Stamen filament broad and flat, edges thickened centre depressed, deep red  $1\frac{1}{2}$  inch long anther oblong blunt  $\frac{1}{2}$  inch long, pubescent. Style very slender filiform red, stigma

clubbed. Stylodes linear narrow.

Woods. Singapore, common. Johor, Gunong Panti. Malacca, Rim. (Griffith.) Pahang, Pulau Tawar.

Griffith's account of this curious plant is very accurate. The leaves are waved, and dark polished green. The flower spike imbedded in the ground silky pubescence on the bracts protecting the buds from injury by wet. The flowers are very inconspicuous in the dark damp jungle, but the pale colored tips of the corolla lobes is conspicuous enough to attract attention to them. The pollen when shed is protected by the pubescence on the anther from the effects of the surrounding wet in a very curious manner. The plant is known as Pua Hitam by the Malays.

*H. affinis* n. sp.

Leaves, lanceolate acuminate 8 inches long by 2 wide, minutely pubescent and fringed with rufous hair, petiole  $\frac{1}{4}$  inch long ligule longer covered with rufous hair. Spike cylindric 3 inches long, bracts oblong ribbed. Flowers four inches long. Calyx tubular bifid as long as the corolla tube 2 inches lobes short acute, base hispid. Corolla-tube dilated at the top, lobes linear oblong upper one hooded and enclosing the other two which are thinner and smaller. Lip shorter little more than half an inch long, hastate, the two side lobes large and rounded apex narrow blunt. Stamen nearly as long as the dorsal corolla lobe, filament broad and thin, anther as long as the filament, apex notched, no distinct crest, cells pubescent. Style slender, stigma small, ovary hispid.

Borneo, Sarawak, Kuching. (Haviland 1764).

Near *H. Leonurus* but differing in the pubescence. The leaves in the specimen are only the terminal ones, the lower ones are probably much larger. A closely allied plant, if not absolutely identical, was obtained by Mr. Fox on the Rumpin river in Pahang. It has a stout woody rhizome with several spikes, which however are too young to show the flowers.

*H. pusilla* n. sp.

Rhizome slender woody sinuous. Stems 8 inches tall very slender. Leaves few 3 or 4 elliptic lanceolate with a long point

6 inches long  $1\frac{1}{2}$  wide, the point, one inch, base broad, no petiole glabrous, ligule very small sheaths somewhat hispid. Spike small few-flowered on a peduncle half an inch long. Bracts ovate mucronate ribbed half an inch long glabrous red. Bracteole cylindric ribbed pubescent. Calyx short. Corolla tube short about  $\frac{1}{2}$  an inch lobes linear red. Lip narrow entire fleshy. Stamen filament short anther  $\frac{3}{8}$  inch long hardly retuse at the apex. Style filiform stigma cup-shaped pubescent. Stylodes  $\frac{1}{8}$  inch rather thick.

Pahang. Kwala Tembeling.

The smallest species I have seen, easily distinguished by the few-flowered spike, the flowers somewhat resembling those of *H. Leonurus* but much smaller.

*H. pauciflora*. n. sp.

Stems rather slender terete distant 12 feet long. Leaves oblong cuspidate glabrous  $1\frac{1}{2}$  foot long 4 inches wide, petiole  $\frac{1}{2}$  an inch long, ligule lanceolate 1 inch. Spikes deeply sunk in the ground 2 to 4 flowered. Bracts narrow lanceolate acute fleshy, white, 2 inches long. Bracteole 2 inches long tubular bilobed, lobes acute white. Calyx narrow at the base dilate upwards trilobed, lobes acute, 3 inches long red. Corolla tube as long, upper lobe lanceolate subacute cherry red, lower ones shorter oblong obtuse deep red. Lip narrowly lanceolate obtuse apex barely enlarged, lateral lobes rounded, flame color, with the central bar thickened yellow. Stamen filament short, anther bent oblong emarginate deep red, pollen cells white. Style filiform, stigma cordate recurved white. Staminodes oblong truncate grooved, buff.

Selangor. Abundant at the Caves, Gua Batu. 1896.

This plant is remarkable for the inflorescence being reduced to but 2 or 3 flowers, with thin cartilaginous white bracts sunk in the ground so that only the upper part of the flowers appear.

*H. triorgyale* n. sp. *Anomum triorgyale* Bak. l. c. 237.

Stems 18 feet tall stout pubescent. Leaves oblong acute  $2\frac{1}{2}$  feet long 7 inches across glabrous above softly pubescent beneath, petiole  $\frac{1}{2}$  inch, ligule large. Spike short and broad ovate 4 inches long and 2 inches through. Bracts broad ovate 2 inches long and wide longitudinally ribbed pubescent deep rose

colour, inner ones lanceolate  $2\frac{1}{2}$  inches long rosy at the tips. Bracteoles bifid tubular 2 inches long. Calyx tubular bifid mucronate, lobes narrow, one subdivided 3 inches long, cherry red. Corolla tube as long, lobes linear oblong blunt, upper one the largest  $1\frac{1}{2}$  inch long, cherry red, lower ones one inch long  $\frac{1}{8}$  inch wide rosy. Lip broad oblong entire blunt one inch longer than the corolla cherry red. Stamen anther rather broad and thick notched, crest none. Stylodes unusually long  $\frac{1}{4}$  inch lanceolate entire white.

Selangor, Ginting Peras (7806). Perak, Thaiping Hills (Dr. King 2105).

One of the finest and perhaps the biggest in the section. The rose colored inflorescence with the cherry colored lip are very beautiful.

*H. albomarginata* n. sp. *Anomum sphaerocephalum* Bak. l.c. 234.

Stems about four feet tall slender red glabrous. Leaves when young light green barred with red, when full grown dark polished green (drying red beneath) glabrous or finely pubescent beneath no petiole ligule short and broad. Spikes 2 inches long subcylindric few flowered. Bracts lanceolate mucronate red 2 inches long  $\frac{1}{2}$  an inch wide pubescent ribbed. Bracteoles in pairs thinner red edged with yellow hairs. Calyx tubular trifold  $1\frac{1}{2}$  inch long lobes tipped with yellow hairs. Corolla tube about as long lobes tipped with white hairs, lower ones shorter than the upper one, lying curved up over the lip. Lip 2 inches long sides curved up over the stamen edged white, apex narrow linear obtuse deep red. Stamen filament short deep red, anther oblong entire deep red, keeled on the back half an inch long pollen yellow. Style slender, stigma heart-shaped with a narrow linear groove.

Penang Hill abundant. Dec. 1895 (7233), Dindings, Lumut. Selangor, Petaling. Perak, Gunong Keledang.

I suppose this plant to be the *A. sphaerocephalum* Bak., but the spike is by no means spherical and the lip is usually at least entire, but in a plant flowered in the gardens I find some flowers with the apex of the lip three-lobed, while others are entire.

*H. velutina* n. sp.

Stems tall and stout. Leaves oblong lanceolate 15 inches long 4 inches wide glabrous above, velvety with long hairs beneath, base tapering into a petiole half an inch long, ligule as long, oblong obtuse velvety. Spike at first globose  $1\frac{1}{2}$  inch long elongating with growth, peduncle 2 inches long. Bracts oblong obtuse about an inch long velvety dark red. Bracteole oblong truncate pubescent dull red  $1\frac{1}{2}$  inch long. Calyx tubular pubescent trifid shorter. Corolla tube shorter than calyx, lobes short oblong rounded at the tip upper one a little longer. Lip oblong rounded bilobed, edges not meeting over the anther cherry red, the edges at the base whitish. Anther oblong retuse. Stigma deep red.

Borneo, Bongaya River.

*H. megalochilus*. *Achasma megalochelos* Griff. Notul. III. 426, Pl. CCCLV. *Amomum megalochilus* Bak. Flor. Brit. Ind. p. 236, *A. rubroluteum* Baker, l.c.

Stems stout and tall 12 to 15 feet, and  $1\frac{1}{2}$  inch through clubbed at the base. Leaves broadly oblong cuspidate base oblique rounded glabrous dark green, 2 to 3 feet long,  $3\frac{1}{2}$  to  $4\frac{1}{2}$  inches wide, petiole half to one inch long, ligule oblong rounded  $\frac{1}{2}$  inch long. Spikes 2 to 3 inches long on long subterranean branches of the rhizome deeply sunk in the earth peduncles  $1\frac{1}{2}$  to 1 inch long covered with ovate bracts. Bracts ovate acute mucronate strongly ribbed when dry, margins ciliate bright red, about an inch long. Bracteoles narrow linear lanceolate pubescent. Calyx 3 inches long trifid lobes acuminate. Corolla tube 2 inches long rather slender, pubescent within, lobes linear acute an inch long, shorter than tube of the lip red. Lip 2 inches longer than the corolla the sides rolled up at the base, spatulate, apex dilated entire or retuse, crimson edges yellow. Stamen filament short broad, anther short oblong about  $\frac{1}{2}$  an inch long emarginate with no real crest deep red. Style slender longer than anther, stigma triangular. Stylodes oblong acute. Ovary pubescent.

Common in wet woods, often forming dense thickets.

Singapore (rare) Bukit Mandai. Pahang, Tahan Woods; Pekan. Malacca, Bukit Sadanen. Negri Sembilan, Bukit Tampin.

Selangor, Kwala Lumpur; Langat. Perak, Dindings, Lumut: Thaiping hills, Penang, Government Hill (Curtis 2419).

The brilliant crimson and yellow flowers appearing often dotted all over the ground are most attractive. In Griffith's description he has evidently intended to write of them "vivide coccineus," which has been printed *viridia coccineus*, and translated into "greenish red." *Amomum rubroluteum* Bak. collected by Maingay in Penang is this plant I should judge from its description. The back of the stamen is prolonged a little beyond the anther as Griffith shows in his figure and this seems from the description to be the only distinguishing character of *A. rubroluteum*.

*H. metriochilus* n. sp. *Achasma metriochilus* Griff. Notul. iii. 427. lc. Pl. As. t. 356. *Amomum metriochilus* Bak. lc. 234.

Stems tall and stout about 12 feet tall. Leaves oblong mucronate, glabrous above, softly velvety pubescent or glabrous beneath over 3 feet long and six inches wide, petiole stout 2 inches long or less, ligule oblong truncate one inch long. Spike about 2 inches long on a stout peduncle. Bracts ovate mucronate ribbed glabrous about an inch long red. Corolla tube 2 inches long pubescent within, lobes broad lanceolate crimson one inch long, longer than the stamen. Lip 2 inches longer than the corolla, linear emarginate, the sides rolled up over the stamen at the base, crimson with a yellow centre. Stamen filament very short, shorter than the anther, anther short and broad, almost square emarginate bent at an angle on the filament, deep rose colour. Style slender, stigma triangular.

Johor, Gunong Panti; Gunong Pulau. Perak, Maxwell's Hill. Selangor, Caves.

*H. macrochilus* n.sp. *Amomum macrochilus* Bak. lc. 235. *Achasma macrochilus* Griff. Notulæ. iii. 429. Ic. Pl. t. 357.

Stem stout 12 feet tall. Leaves elliptic oblong cuspidate base rounded unequal, glabrous 15 inches long 4 inches wide, petiole half an inch long or less, ligule shorter ovate obtuse. Spike subcylindric with rather thin lanceolate acute bracts, glabrous ribbed 2 inches long. Bracteoles narrow linear glabrous. Calyx tubular dilated upwards trifid, lobes acute  $1\frac{1}{2}$  inch long.

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Corolla tube longer 2 inches in length lobes short broad blunt. Lip  $1\frac{1}{4}$  inch long, narrow linear apex deeply bifid, lobes narrow  $\frac{1}{4}$  inch long. Anther  $\frac{1}{4}$  inch long deeply emarginate.

Malacca at Ayer Panas (Griffith). Perak, Thaiping Hills (Curtis) (King 1897).

Apparently rare as I have not met with it. It is easily distinguished by its narrow lip deeply forked at the end. The flowers are entirely red according to Griffith.

Baker's *Amomum gomphocheilus* (Flor. Brit. Ind. vol. p. 226) is based upon the plant numbered 1897 of King's collection but he says the tip of the lip is cuneate, while the plant I have received from Calcutta under this number is as described above and is clearly Griffith's *Achasma macrocheilus*.

§ 2. PHÆOMERIA Lindl.

*H. imperialis* Ridl. *Phæomeria imperialis* Lindl. Introd. Nat. Syst. ed. 2,446. *Alpinia magnifica* Roscoe. Scitam. 75.

Stems about 13 feet tall one inch through. Leaves oblong acute green glabrous 2 feet long and 6 inches across, ligule ovate blunt nearly an inch long. Scapes about 3 feet tall partly covered with green sheaths, head cone-shaped elongating as the flowers open to 4 inches. Bracts lower ones oblong ovate 4 inches long and 2 inches across, spreading or recurved fleshy empty, upper ones linear oblong, all waxy pink with white edges. Bracteoles tubular spathaceous 3-lobed, short. Calyx  $\frac{1}{2}$  inch long deeply bifid lobes acute red. Corolla tube barely an inch long, lobes lorate thin obtuse pink. Lip longer narrow oblong obtuse, sides convolute, crimson with a white edge. Stamen filament linear flat white pubescent, anther oblong emarginate crimson splitting at the top. Style rather stout, stigma clubbed with a slit on the lower face. Stylodes short broad and thick, lobed. Fruits obconic green hairy, one inch through in a compact head, seeds numerous black enclosed in a translucent acid pulp.

Commonly cultivated under the name of Kantan, the spikes in bud being eaten as a curry stuff. This form may possibly not be native.

Johore, Kota Tinggi. Perak near the Waterfall, Thaiping.

Var. *speciosa*. *Elettaria speciosa*, Bl. Enum. I. p. 51. *A. elatior* Hook. Journ. Bot. I. p. 359.

Margins of lip yellow.

Native of the Peninsula, Java and Sumatra. Selangor, Rawang. Perak, Tambun near Ipoh, Larut (King's Collector 3075).

*Elettaria anthodioides* Teysm. is probably the same plant but appears to be rather smaller.

*H. fulgens* n. sp.

Rhizome stout and woody an inch through. Leafy stems about 15 feet tall and one inch through swollen at the base. Leaves oblong with a broad unequal base 2 feet long and 6 inches wide glabrous except the edge which is pubescent, dark green above tinted purple beneath when young, petiole an inch long, ligule covered with brown wool. Scape four feet tall, stout  $\frac{3}{4}$  inch through, covered with dark green sheaths rounded at the tip and mucronate below the tip, head about 3 inches tall 4 inches across. Bracts stiff coriaceous, lower ones broadly ovate with a stiff mucro 3 inches wide and long dull red outside, polished blood red within edges greenish white. Inner bracts (floral ones) linear oblong obtuse dull red edged whitish mucronate. Flowers about as long as bracts. Calyx spathaceous with three short acute points and three red ridges corresponding  $1\frac{1}{4}$  inch. Corolla lobes linear obtuse pink longer than calyx  $1\frac{1}{2}$  inch. Lip ovate obtuse deep red margin yellow  $\frac{1}{2}$  inch long, beyond the tube. Stamen shorter, anther red deeply notched  $\frac{1}{4}$  inch long. Stigma large style pubescent. Stylodes broad at the base lobulated above.

Perak, Larut hills.

This species differs from *H. imperialis* in its stouter and shorter scape broader and shorter head with stiff red ovate bracts, nearly entire calyx very shortly split, longer and broader corolla lobes, and larger stamen. In many respects it is intermediate between *H. imperialis* and *H. hemispherica* (*Amomum hemisphericum* Hook fil.).

*H. venusta* n. sp.

Stems ten feet tall  $1\frac{1}{2}$  inch through clubbed at the base,



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above terete and smooth. Leaves oblong green over 2 feet long and 6 inches wide narrowed towards the base, ligule short rounded edge pubescent. Scapes 2 feet tall, peduncle  $\frac{1}{2}$  an inch through partly covered with mucronate pink sheaths the rest arachnoid. Head broad cup-shaped, base much broader than the peduncle, 3 inches long by 5 wide, outer bracts very broad oblong the tips recurved, appressed to the flowers 3 inches long  $2\frac{1}{4}$  wide rosy, somewhat fleshy, receptacle conic. Flower bracts linear oblong shorter than the flowers 2 inches long,  $\frac{1}{4}$  inch wide. Bracteole shorter spathaceous  $1\frac{1}{4}$  inch long split along the back whitish. Calyx  $1\frac{1}{2}$  inch long trifold split on one side deep red. Corolla lobes linear spatulate  $1\frac{1}{4}$  inch long obtuse red pink. Lip half an inch long thin oblong apex rounded blunt white the centre spotted pink. Stamen filament with white hairs, anther oblong inch long white cells covered with yellow hairs, emarginate. Style broad linear flattened above terete below. Stigma oblong flattened red. Fruit large conical beaked, glabrous red 3 inches long  $1\frac{1}{2}$  through at the base, ovules very numerous.

Selangor, Woods at Ginting Bidai.

One of the noblest species with the inflorescence in the form of a large broad-bottomed cup rose coloured and wax-like. The points of the erect outer bracts are turned downwards. The flowers are also rosy, and the fruit in a large round head waxy red with long projecting beaks.

*H. Maingayi mibi. Amomum Maingayi* Baker l.c. 235.

Rhizome long creeping throwing up leafy stems at some distance apart, shoots red roots strong and wiry. Stems about nine feet tall  $\frac{3}{4}$  inch through olivaceous green. Leaves oblong acute 18 to 24 inches long, 5 inches wide glabrous above, pubescent beneath, keel large rounded, petiole about  $\frac{1}{2}$  inch long apex rounded sheaths striate glabrous. Peduncle graceful but stiff, a foot tall, with pink sheaths with oval apices, head sub-globose  $1\frac{1}{2}$  inch long, outer. Bracts broad, with rounded edges, retuse mucronate appressed, pink entirely covered with silvery pubescence except the glabrous crimson margins. Inner bracts lanceolate over one inch long. Bracteole spathaceous tubular one inch long pubescent split on one side with three lanceolate muc-

ronate points. Flowers 2 inches long rose-colored. Calyx tubular with three lanceolate points longer than the corolla. Corolla lobes blunt oblong. Lip 3-lobed, laterals erect oblong, median lobe longer oblong dark rose colour. Stamen filament linear broad, anther bent at an obtuse angle more than  $\frac{1}{4}$  inch long deeply excavate dark crimson, pollen white. Style very slender, stigma reniform slit linear, not central, dark madder colour. Fruit obconic nearly glabrous half an inch long.

Singapore, Bukit Timah, Sungei Buluh. Pahang, Kota Glanggi. Selangor, Dusun Tua. Perak (Wray No. 3).

From the very short inadequate description, *Nicolaia pallida* Horan. from Java may be the same species. This plant is really intermediate between the two sections.

#### PLAGIOSTACHYS n. gen.

Stems usually very tall and stout with lanceolate leaves, pubescent. Flower spike thick borne on a peduncle covered with sheathing leaves and projecting from the side of the leafy stalk. Bracts oblong ovate lacinate. Flowers numerous small and fleshy. Calyx spathaceous short. Corolla tube short and thick, lobes oblong or ovate fleshy. Lip flat oblong. Stamen with a short thick filament an oblong anther, emarginate but with no crest. Staminodes two short subulate processes. Style rather short. Capsule ovoid conic or oblong, three-celled seed 3 or 4 in each cell, angled.

Malay peninsula and Borneo.

The type species of this curious genus I referred originally to *Amomum*, being unwilling to make a new genus of it, as long as the genus *Amomum* was understood as containing a heterogeneous mixture, but I am by no means certain now that the genus has not really more affinity with *Alpinia*. The peculiar position of the inflorescence is normally unique in the order. The fleshy simple flowers with a crestless anther are certainly more like those of some *Alpinia* than anything else, and Mr. Baker has referred *P. strobilifera* to that genus.

*P. strobilifera* n. sp. *Alpinia strobilifera* Bak. Kew Bulletin 1898. 235.

Stems about 2 feet tall fairly stout pubescent. Leaves lanceolate pubescent six inches long and three wide, sheath

tomentose, ligule very short pubescent. Spike lateral 3 inches long, rachis tomentose. Flowers numerous  $\frac{1}{2}$  an inch long, crowded, buds red, shortly stalked. Bracts brownish  $\frac{1}{4}$  inch long ovate hairy outside. Calyx cartilaginous tubular 3-lobed red. Corolla tube barely as long, thick, lobes oblong, upper one hooded, lower ones shorter red. Lip oblong bilobed apex orange base reddish orange. Anther large oblong retuse pubescent red.

British North Borneo, Bongaya River 1897; Sandakan (Creagh).

*Pl. lateralis* n.sp. *A momum laterale* Rid. Trans. Linn. Soc. III. p 381.

A stout plant usually about six feet tall, with a thick underground rhizome. Leaves lanceolate acuminate pubescent  $2\frac{1}{2}$  feet long, 4 inches wide, dark green, petiole one inch long, ligule obtuse bilobed  $\frac{1}{4}$  inch long. Spike about six inches long protruded a foot or more above the ground from the side of the stem, sometimes branched, thick cylindrical, on a peduncle covered with ovate sheaths. Bracts oblong with lacinate edges. Calyx conic tubular as long as the corolla white. Corolla tube thick  $\frac{1}{4}$  inch long, lobes ovate acute dark red fleshy. Lip short obtuse flat emarginate, fleshy orange yellow, papillose. Stamen filament short thick pubescent, anther oblong pubescent white. Stamens two short acute teeth. Stylodes flesh colour oblong truncate, with a short blunt tooth. Capsule  $\frac{1}{2}$  an inch long, ovoid conic thin-walled, pale brown. Seeds 3 - 4 in each cell.

Singapore, Bukit Timah, Bukit Mandai, Reservoir Woods. Negri Sembilan, Perhentian Tinggi.

Another species I found in fruit on Gunong Pantu in Johore was as large as the last species but had spikes six inches long and oblong fruit  $\frac{1}{2}$  an inch in length containing about 12 black angled seed very aromatic.

#### ELETTARIOPSIS.

This genus is most closely allied to *Elettaria*, and like it is almost peculiar in having the flower spikes borne on long creeping branches generally imbedded in mud, and rooting at intervals. The rhizome is slender and only slightly aromatic. The

leaves either solitary, *E. exserta*, *E. Curtisii*, or tufted, *E. serpentina*, or borne on an erect stem a foot or more tall. The flower spikes scattered along the creeping branches of the rhizome, are very short, only an inch or two long, and bear several flowers in the axils of dry short bracts. The calyx tube is usually long with three lobes, and the corolla tube long and graceful with narrow lobes. The lip is fairly large entire and rounded, usually white with a central yellow bar with red marks along it. The filament of the stamen is broad and short, the crest of the anther large and rounded, sometimes toothed. The style is slender, increasing above the anther, the stigma conical and rather large. The fruit, which is rarely to be met with, is in *E. longituba* a large round white capsule.

These plants are to be met with in damp woods often in great abundance, but seldom seen in flower.

#### SPECIES.

- |                            |                              |                               |
|----------------------------|------------------------------|-------------------------------|
| Leaf solitary.             | Leaves few in a tuft.        | Leaves on an erect stem.      |
| 1. <i>E. exserta</i> Bak.  | 3. <i>E. serpentina</i> Bak. | 4. <i>E. latiflora</i> Ridl.  |
| 2. <i>E. Curtisii</i> Bak. |                              | 5. <i>E. pubescens</i> Ridl.  |
|                            |                              | 6. <i>E. multiflora</i> Ridl. |
|                            |                              | 7. <i>E. longituba</i> Ridl.  |

*E. exserta* Baker l.c. 251. *Cyphostigma exserta* Scortechin. Nuov. Giorn. Bot. Ital. viii. 310 t. 13.

Rhizome slender, leaf usually solitary elliptic acute tapering into the petiole four to six feet tall including the petiole, the blade three feet long and one across. The scape erect with several scattered sheaths half an inch in length, bearing a single flower. Calyx tube slender three-lobed one inch long, corolla tube slender three inches long with lanceolate lobes  $\frac{3}{4}$  inch in length. Lip oblong entire yellow with two red lines in the centre. Stamen with a short rounded crest, style longer than the crest, stigma cup-shaped.

Perak, Kinta (Scortechini).

The single gigantic leaf, and the erect scape with a single flower, distinguish this from all other species. I have never seen it.

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*E. Curtisii* Bak. l.c. 252.

Rhizome far creeping, with woolly roots. Leaf solitary, blade a foot long and three inches wide lanceolate acuminate glabrous tapering below into the petiole, which is eight inches long and included in a long ribbed sheath. Flowering stems short three inches long. Bracts oblong lanceolate about half an inch long. Spikes scattered one or two flowered. Calyx spatheaceous ampliate unequally three-lobed an inch long. Corolla tube 2 inches long, slender enlarged upwards, lobes oblong blunt white  $\frac{1}{2}$  an inch long and  $\frac{1}{4}$  wide. Lip obovate oblong median bar thickened  $\frac{3}{4}$  inch long. Stamen filament short rather broad, anther thick crest oval entire large. Style shorter than the crest, stigma cup-shaped large.

Penang Hill. Bukit Laksamana (Curtis 1705).

*E. serpentina* Bak. l.c. 252.

Rhizome as in *E. Curtisii*. Leaves three in a tuft unequal lanceolate acuminate narrowed into the petiole, glabrous, blade six to 8 inches long, two inches wide, petiole 4 inches long, glabrous. Flowering stems short two inches long covered with rather short oblong dry sheaths. Calyx tube one inch long, lobes linear  $\frac{1}{4}$  inch long. Corolla tube as long as the calyx rather thick, lobes oblong  $\frac{1}{2}$  an inch long, white. Lip oblong obovate cuneate apex rounded longer than the petals  $\frac{3}{4}$  inch long. Stamen filament broad and short, crest of anther very large oblong rounded. Style rather thick shorter than the crest, stigma large obconic with a very large slit.

Penang, 1000 to 1500 feet alt. May (King's Collector) Fls. white red brown and yellow in centre.

*E. latiflora* n. sp.

Rhizome far creeping  $\frac{1}{4}$  inch through almost covered with sheaths faintly aromatic, roots stout woolly. Leafy stems six inches to a foot tall with about five leaves blade lanceolate ovate lanceolate cuspidate dark green glabrous above pubescent beneath 10 to 13 inches long 2 to 4 inches wide, petiole rather slender 2 to 4 inches long base of the stem covered with long sheaths. Floral stems often numerous three or four inches to about six or even longer, spikes rather distant 2 flowered:

Bracts closely wrapping the flower pinkish  $\frac{1}{2}$  an inch long. Calyx  $1\frac{1}{2}$  inch long terete, the apex entire lanceolate split on one side red. Corolla tube three inches long slender white lobes oblong obtuse apices incurved  $\frac{3}{4}$  inch long nearly  $\frac{1}{4}$  inch wide yellowish white. Lip large obovate broad one inch long and as wide in the widest part, centre thickened yellow with a crimson bar on each side, tip yellow, the rest pure white. Stamens short and broad, anther cells diverging at the top; crest ovate thin toothed bent upwards at an obtuse angle to the filament. Style considerably longer than the anther but shorter than the crest, stout. Stigma obcuneate with a short conical process behind the lip-like stigmatic surface.

Singapore in dense woods, Bukit Timah, Kranji, Sungei Buluh. Perak, Larut (King's Collector) 2886. Bujong Malacca.

*E. pubescens* n.sp. *Amomum eletarioides* Baker Fl. Brit. Ind. *Amomum* sp. Griffith Notulæ asiaticæ III. 417. *Elettaria* sp. Tab. CCLII. 2.

Stems stout as much as half an inch through at the base about two feet tall, base covered with sheaths, above leafy. Leaves about 5 or 6 oblong lanceolate cuspidate softly thickly pubescent beneath above glabrous 6 to 8 inches long,  $1\frac{1}{2}$  to 2 inches wide, petiole  $\frac{1}{4}$  inch long, sheaths about three inches, ligule very short. Floral stems as much as two feet long, often much shorter usually numerous, rather slender. Spikes usually distant short one inch or less long bases covered with ovate scale-leaves. Bracts ovate lanceolate  $\frac{1}{2}$  an inch long pubescent ribbed edges ciliate. Flowers in pairs. Calyx slender enlarged upwards an inch long lobes linear acute, covered with long silky hairs, nearly or quite as long as the corolla tube. Corolla tube thick enlarged upwards pubescent with silky hairs, lobes narrow linear oblong obtuse  $\frac{1}{2}$  an inch long white. Lip about an inch long obcuneate obtuse pubescent in the centre. Stamen filament broad, connective rather large three-lobed, central lobe largest. Style stout stigma cup-shaped.

Penang, Waterfall (Curtis 2276) Penara Bukit (Ridley 7236). Negri Sembilan, Foot of Bukit Tampin (J. Goodenough).

This grows in masses in thickets and waste ground often

near villages whence it is called Pua Kampong. It flowers in March and May. There can be little doubt that this is the *Amomum* of Griffith on which Baker's *A. elettaroides* was based. His description and drawing *Elettaria* sp. are fairly accurate. The three-lobed anther crest is not very clear however. There is a large rounded lobe at the back behind the stigma and the angle above the anther tips are somewhat drawn out. Jack's *Amomum biflorum* is probably the same thing though he says that the leaves are quite smooth except the midrib. He obtained it in Penang. The pubescent leaves and flowers and short corolla tube hardly longer than the calyx distinguish it from *E. latiflora* to which it is most nearly allied.

*E. longituba* Ridl. Trans. Linn. Soc. iii. 382.

Stem tall. Leaves oblong lanceolate cuspidate two feet long by two inches wide inequilateral at the base tapering into the petiole glabrous above, woolly pubescent beneath nerves very close, petiole one inch long, pubescent, ligule short pubescent. Flowering stems stout, becoming almost woody when fruiting and then  $\frac{1}{4}$  inch through, very long. Spikes numerous about half an inch apart. Sheathing leaves oblong cuspidate dark brown two inches long and nearly an inch wide. Flowers in pairs. Calyx tube two inches long slender enlarged above, tip ovate, three toothed. Corolla tube  $\frac{1}{4}$  inch longer than the calyx, lobes oblong obtuse rosy one inch long and  $\frac{1}{4}$  inch wide. Lip obovate crenulate  $1\frac{1}{4}$  inch long, white, with four pink lines in the middle, tip yellow. Stamen filament narrow pubescent crest 4 toothed. Stigma club-shaped, apex flat. Capsule globular white an inch through containing many triangular compressed black seeds.

Pahang, Tahan River (Ridley 2403). Selangor, Gunong Iitam. (Goodenough). Upper Perak at 300 feet elevation (Wray 3586).

The great size of the plant, and the large bracts, or rather sheathing leaves and long graceful calyx tube distinguish this remarkable plant. The leaves distributed with my plant No. 2403 I find really belong to it as Wray's plant has exactly similar ones. The Bukit Timah plant alluded to in the Trans. Linn. Soc. 1c, is a large form of *E. latiflora*.

*E. multiflora* n. sp.

Rhizome far creeping woody. Stems tall rather stout nearly half an inch through. Leaves numerous lanceolate cuspidate glabrous shortly petioled, one foot long two inches wide, ligule short rounded, sheath about three inches long. Flowering stems over two feet long slender, branched. Spikes secund very numerous and close together, sheathing leaves oblong cuspidate ribbed  $\frac{1}{2}$  inch long by  $\frac{1}{4}$  inch wide. Flowers five or six in a spike, rather small. Bracteoles lanceolate short. Calyx tube very slender one inch long, lobes equal oblong lanceolate cuspidate pubescent, points ciliate  $\frac{3}{8}$  inch long. Corolla tube as long as calyx lobes, lobes obovate spathulate  $\frac{3}{8}$  inch long more than  $\frac{1}{4}$  inch wide white. Lip entire obovate pubescent white with a central yellow bar and red markings  $\frac{1}{2}$  an inch long. Stamen filament broad, crest rounded rather small.

Sumatra on the Kelantan river near Siak (8972).

A very distinct species in its slender flower stems crowded with spikes each containing five or six small but pretty flowers only one or two of these however are out at once. I found it growing in a dense jungle swamp, the stems creeping through almost liquid mud, decaying leaves and water.

## GEOSTACHYS.

Rhizome stout woody, not subterranean, with stout roots. Leafy stems two or three feet tall with lanceolate cuspidate leaves, glabrous, petioled. Scapes lateral usually short decurved so as to lie on the ground (in one species erect). Flowers secund, two or three in a dry brown papery bract on a short peduncle, projecting but little from the involute bract. Calyx tubular spathaceous with an entire cuspidate limb, corolla tube shorter than the calyx, thick, lobes oblong as long as the tube, lip entire obovate as long as the corolla. Stamen with a short filament and linear anther with a small rounded crest or none, staminodes none.

This genus is closely allied to *Alpinia* with which it was doubtfully placed by Baker under the section *Geostachys* which I have reserved for its generic name. It differs in the flowers being borne not on the ends of the leafy stems, but in lateral leafless ones, also in the peculiar dry brown bracts which are



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rolled round the flower, and the curious tubular calyx with an ovate limb ending in a long point. The rhizome usually very woody stands above the ground often supported on its roots for some height. The coloring of the flowers in all that I have seen alive is the same, buff yellow, more or less ornamented with red spots. The species *G. elegans* from Mount Ophir, is peculiar in having its inflorescence erect on a slender stem and not lying down upon the ground.

*G. decurvata* n. sp. *Alpinia decurvata* Bak. l.c. p. 257.

A large tufted plant with a stout rhizome. Stems stout 4 or 5 feet tall strongly ribbed when dry. Leaves lanceolate acuminate one foot and a half long and three inches across glabrous close-veined, petiole 2 inches long, ligule  $\frac{1}{2}$  an inch long oblong ovate truncate, sheath ribbed when dry. Scapes deflexed base suberect covered with numerous dry long sheaths 12 to 14 inches long, floriferous portion deflexed or horizontal, with about 20 secund flowers, pedicel  $\frac{1}{2}$  an inch long. Bracts at base  $\frac{1}{4}$  inch long lanceolate acute. Flowers in pairs included in brown boat-shaped mucronate sheaths one inch long. Calyx spathaceous as long as the corolla tube. Corolla tube not projecting beyond the bract, lobes lanceolate obtuse, half an inch long buff color. Lip one inch long obcuneate oblong apex rounded darker colored than the petals. Stamen with linear filament, anther linear with a small rounded petaloid crest. Capsule elongate glossy dark red.

Perak, Maxwell's Hill (Ridley 5189) (King's Collector 6310).

*G. secunda* n.sp. *Alpinia secunda* Bak. l.c. 257.

Stems stout and tall, leaves narrow lanceolate, over a foot long, one inch and a half wide, glabrous, petiole one inch long, ligule  $\frac{3}{8}$  inch long. Scapes deflexed six inches long base covered with large dry lanceolate acute sheath leaves 2 inches in length, pubescent, rachis and pedicels hispid. Flower spike numerous crowded secund, peduncles  $\frac{1}{2}$  inch long, flowers four in a spike. Bracts one inch long ovate lanceolate cuspidate pubescent. Calyx spathaceous with a long cusp  $\frac{1}{2}$  an inch long. Corolla tube shorter than calyx, lobes oblong lanceolate  $\frac{1}{2}$  an inch long. Lip oblong obtuse longer than the corolla lobes. Stamen fila-

ment short anther linear parallel, no crest. Style little longer.  
Perak (Scortechini 881).

*G. rupestris* n. sp.

Rhizome stout with very long pubescent roots. Leafy stems stout, leaves broadly lanceolate cuspidate glabrous 8 inches long by  $1\frac{1}{2}$  wide, ribs close elevated when dry, petiole short. Scapes about 3 inches long decurved, bases covered with large dry sheaths the uppermost lanceolate acute ribbed one inch long. Flowers secund pedicels glabrous  $\frac{1}{4}$  inch long solitary. Bract ovate one inch long. Calyx ampliate spathaceous ovate cuspidate pink  $\frac{1}{2}$  an inch long longer than the straight fairly slender corolla tube, corolla lobes oblong lanceolate  $\frac{1}{2}$  inch long. Lip obovate rounded longer than the corolla, yellow with red markings. Stamen filament short, anther narrow linear with a small rounded crest.

Kedah Peak 3-4000 feet. June 1893.

This much resembles *G. secunda* but differs in its broader leaves, short pedicels and solitary flowers, besides being much more glabrous. The flowers are dull yellow with red spots on the lateral petals and lip at the base.

*G. penangensis* n.sp.

Rhizome stout woody covered with dry sheaths, raised about an inch above ground. Stems usually numerous about three feet tall slender. Leaves narrowly lanceolate cuspidate glabrous about a foot long one to one and a half inches across very shortly petioled, ligule ovate obtuse  $\frac{1}{4}$  inch long. Panicles deflexed secund 3 inches long covered at the base by large brown papery sheathing bracts, rachis glabrous peduncles  $\frac{1}{4}$  inch long pink. Outer bracts slightly pubescent  $\frac{1}{4}$  inch long brown spathaceous enclosing a pair of flowers. Calyx spathaceous cuspidate one inch long. Corolla tube shorter red rather thick lobes subequal oblong obtuse  $\frac{1}{2}$  an inch long. Lip nearly an inch long and half an inch wide, three-lobed lobes short rounded, median lobe obovate rounded ocreous yellow minutely pubescent. Stamen longer than the lateral lobes of the lip, anther  $\frac{1}{4}$  inch oblong with no crest. Style barely longer very slender. Styloides yellow lanceolate conic, rather large.

Penang. Common on dry banks at 2000 feet alt. (Curtis 327). It flowers in June and July.

This is most nearly allied to *G. rupestris*, but has much narrower leaves and smaller flowers, and there is no trace of a crest on the anther.

*G. elegans* n. sp.

Rhizome stout and woody covered with dry brown sheaths, with very stout firm roots. Stems about 3 feet tall bases covered with brown sheaths, leaves narrow lanceolate acuminate about a foot long, and one inch broad glabrous, petiole  $\frac{1}{4}$  inch long, ligule ovate obtuse  $\frac{1}{8}$  inch long. Scapes erect  $1\frac{1}{2}$  feet tall, the lower part covered with dry brown sheaths, lowest ones about 2 inches long obtuse, upper ones acute. Rachis pubescent. Panicle 5 or 6 inches long with very short peduncles each bearing two flowers enclosed in an ovate bract, outer bracts ovate mucronate pubescent brown  $\frac{1}{2}$  an inch long. Calyx spathaceous brown acuminate longer than the corolla tube. Corolla half an inch long tube short, lobes oblong obtuse, buff. Lip obovate oblong retuse little longer than the petals. Stamen filament very short, anther oblong narrow, notched  $1\frac{3}{8}$  inch long, crest none. Style slender, stigma cup-shaped. Capsule orange globose  $\frac{3}{8}$  inch long glabrous crowned with the dry calyx. Seeds angled.

Malacca on Mount Ophir. (Derry 603; Ridley 3137) Common up to 4000 feet elevation. A very distinct species with tall rather slender scapes, and smaller flowers than any other species. It grows in large tufts on rocks, and in the woods.

#### ALPINIA.

This is a fairly well marked genus, distinct in bearing the flowers in terminal panicles or racemes on tall leafy stems, the flowers numerous often large and showy, the corolla tube usually barely longer than the tubular calyx, the lobes linear or oblong, the lip large obovate rolled round the stamen, (Catimbium) or small narrow lobed, (Hellenia) staminodes sometimes absent, or horn-like subulate processes rarely broad and spatulate. The stamen long, fleshy, the anther thick, crest absent (Catimbium) or well developed (Cenolophon). The fruit a globose or cylind-

ric capsule, orange colored, green, or brown, black dry dehiscent pubescent or hairy seeds numerous angled small enclosed in a sweet pithy aril, aromatic.

The genus is confined to East India, China, and North Australia. Many species are cultivated for their beautiful flowers, some especially *A. Galanga* and *A. officinalis*, the Galangals for their aromatic rhizomes. The species have been arranged in four sections, viz., *Ethanium*, with the buds not enclosed in large bracteoles, and no anther crest, *Catimbium* with large bracteoles, and no crest, *Hellenia* with a small anther crest and *Geostachys* which I would exclude as a distinct genus. This grouping is not however quite satisfactory as it separates closely allied plants, while placing very different species together. Nearly all fall readily into three groups which indeed might be called genera, viz.,

(A). *Hellenia*. Flowers small, white or pink, lip narrow not convolute often bifid. Anther usually crested. Fruit small globose few-seeded.

(B). *Catimbium*. Flowers large, lip broad obovate convolute, red and yellow. Anther not crested, fruit globose, large, seeds small numerous.

(C). *Cenolophon*. Flowers large, lip entire oblong orange anther crested. Fruit usually cylindric or fusiform, seeds large few.

#### *Hellenia*.

Lip entire obovate.	<i>A. conchigera</i> .
Lip „ narrow oblong.	<i>A. secundiflora</i> .
Lip bifid, spatulate	<i>A. Galanga</i> .
„ lobes narrow, linear, no anther crest.	<i>A. melanocarpa</i> .
„ „ „ „ anther crested.	<i>A. scabra</i> .
„ four-lobed	<i>A. rosella</i> .

#### *Catimbium*.

Panicle or raceme lax, bracts oblong or boat-shaped.	
Staminodes absent, bracteoles small caducous.	<i>A. mutica</i> .
„ bracteoles large boat-shaped.	<i>A. assimilis</i> .

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Staminodes subulate glabrous, corolla orange. *A. Rafflesiana*.  
 " " white  
 " " lip broader than  
 long *A. nobillima*.  
 Staminodes short blunt hairy. Lip longer than broad  
*A. latilabris*.

*Cenolophon*.

Raceme lax nodding flowers large *A. petiolata*,  
 Raceme erect, dense flowers smaller.  
 Leaves base unequally cordate *A. macrostephanum*.  
 base narrowed, blade lanceolate *A. vitellina*.  
 " blade ovate broad *A. cannefolia*.  
 Aberrant plant, with cap-shaped bracts, and spatulate  
 staminodes *A. comosa*.

*Alp. Alugas* Rosc. *A. calcarata* Rosc. *A. bracteata* Roxb. and  
*A. nutans* Rosc. are all mentioned as occurring in the Malay  
 peninsula by Mr. Baker but without any locality or collector's  
 name. I have not seen specimens wild or even cultivated of any  
 except the last, which was formerly cultivated in a few gardens.

*A. conchigera* Griff. Notul iii. 424. Ic. Pl. Ast 354.

A dwarf plant about two feet tall, with an aromatic rhizome.  
 Stems slender 6 feet tall pale green. Leaves oblong glabrous  
 obtuse with a very short point light green, edges ciliate, one foot  
 long about 3 inches wide, petiole broad  $\frac{1}{2}$  an inch long, ligule thin  
 short rounded pubescent. Panicle erect about a foot long, bran-  
 ches short. Calyx short thick rounded, teeth 3 triangular obtuse  
 equal and regular  $\frac{3}{16}$  inch long. Corolla tube very short, lobes  
 white oblong elliptic blunt, hooded  $\frac{1}{4}$  inch long wide much shor-  
 ter than the stamen. Lip obovate with two short teeth at the base  
 triangular acute sides turned up, yellowish white with 4 red  
 streaks on each side. In the centre at the base is a retuse callus  
 edged with pink and a red spot on each side. Stamen yellow  
 curved, as long as the lip, anther short elliptic, cells divergent at  
 the tip and converging below;  $\frac{1}{4}$  an inch long. Style project-  
 ing beyond the anther, stigma cup-shaped. Capsule globose red.

In damp open spots. Malacca, at Umbai; Chenana putih.  
 Province Wellesley, Kubang Semang; (Curtis). Johore, Kuala

Sembrong (Kelsall) Perak, Kwala Kangsa. Pahang, Rumpin river. Also Chittagong.

The Lankwas Ranting of the Malays.

*A. melanocarpa* n. sp.

*Hellenia melanocarpa* Teysm and Binn. Pl. Hort. Bogor. cult. p. 328.

Stems tufted two to six feet tall from a stout rhizome. Leaves lanceolate acuminate narrowed at the base about six inches long and two inches wide glabrous, petiole half an inch long, ligule as long entire. Panicle about six inches long, with short branches  $\frac{1}{4}$  inch long usually 3-flowered. Bracts very small lanceolate cuspidate pink. Calyx tubular nearly  $\frac{1}{2}$  inch long white. Corolla tube little longer, lobes oblong obtuse, white. Lip with a narrow base then dilated and bifid, lobes blunt, pink. Stamines two small green teeth at base of stamen. Filament linear flat, anther oblong fleshy retuse with no crest. Style but little longer stigma cup-shaped. Capsule small globose black, or red.

Singapore. Kranji, Selitar, etc. Pahang at Kwala Pahang.

This is I think Teysmann's *Hellenia melanocarpa* which was obtained from Sumatra. It has much the habit of *A. conchigera* Griff. but can be distinguished by its pink bifid lip.

*A. Galanga* Sw. Obs. Bot. 8. *A. viridiflora* Griff. Notul. iii 423. Maranta Galanga. L. Sp. pl. 2.

A tall plant about 6 or 7 feet tall with numerous stout stems, Leaves lanceolate acute very finely striate dark green above lighter beneath with a thin white edge, 18 inches long  $3\frac{1}{4}$  broad with a short petiole  $\frac{1}{4}$  inch long, sheath striate deeply split, ligule entire rounded  $\frac{1}{4}$  inch long. Bracts lanceolate acute  $\frac{1}{2}$  an inch long. Panicle compact six inches or more long. Flowers numerous sweet-scented. Pedicels  $\frac{1}{4}$  inch long finely pubescent. Calyx tubular very unequally trifid,  $\frac{1}{2}$  an inch long, lobes ovate, white. Corolla tube no longer than the calyx, lobes recurved fleshy linear, apex cucullate,  $\frac{3}{4}$  inch long green. Lip one inch long porrect, spatulate, claw narrow light green fleshy with two low ribs and a groove between, limb bifid white with red streaks on each side, sides curved up. Stamines two short pointed

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processes at the base pink. Stamen about an inch long filament broadly linear white, anther notched at the apex, bent at an angle with the filament, cells linear, fleshy, thick. Style very slender fusiform, stigma rounded. Stylodia ovoid blunt small. Fruit small  $\frac{1}{4}$  inch long elliptic red with one or two rounded seeds only.

Commonly cultivated and long persisting after the ground is abandoned. This, the "Lankwas" of the Malays, whence its name Galanga, does not seem to be known in a wild state anywhere.

*A. Zingiberina* Bak. (Bot. Mag. t. 6944) the Siam ginger, much resembles this but is distinct in the form of the lip which has no distinct claw, but is obovate and notched all round the edge, and much less deeply bilobed.

*A. scabra*. Benth Gen. Plant. iii 648. Bak. lc. 256. *Hellenia scabra* Bl. Enum. 60.

A tall plant with stems about six feet tall. Leaves lanceolate cuspidate a foot and a half long and two inches broad dark green (drying pale greenish) scabrid on the upper surface, petiole winged to the base  $\frac{1}{4}$  inch long, ligule oblong truncate  $\frac{1}{4}$  inch long. Panicle upwards of two feet long, upper branches short two or three lower ones usually six inches long. Flowers rather small on pedicels nearly  $\frac{1}{4}$  inch long ebracteate, white. Calyx campanulate  $\frac{1}{4}$  inch long, with three teeth. Corolla tube longer rather slender curved, lobes lanceolate oblong obtuse,  $\frac{1}{4}$  inch long, dorsal one-hooded, white. Lip narrow shorter than the petals, deeply bifid lobes linear oblong. Stamen long filament linear slender, anther cells slightly divaricate, crest very short. Capsule globose smooth  $\frac{1}{3}$  inch through.

This plant grows in woods on the hills at about 1000 feet altitude. Its general appearance is that of *A. galanga*. The leaves are only scabrid when dry.

Johore, Gunong Pulau. Selangor, Bukit Hitam. (Kelsall). Perak, Thaiping hills; Bujong Malacca. Kedah, Kedah Peak.

*A. rosella* n.sp.

A small tufted plant stems about 2 feet tall rather slender. Leaves lanceolate acuminate with a long point glabrous rather

stiff 8 inches long and one wide or less, petiole nearly  $\frac{1}{4}$  inch long, ligule as long. Panicle absent 4 inches long, with a few short branches at the base, flowers in threes on short peduncles, small rosy. Calyx campanulate  $\frac{1}{2}$  inch long lobes very obscure. Corolla tube longer dilated upwards, lobes short ovate oblong rounded. Lip 4 lobed with a short narrow claw two erect rounded oblong lobes and the median one divided into two narrow linear oblong obtuse lobes. Stamen considerably longer  $\frac{1}{4}$  inch long, anther linear oblong with a small rounded lanceolate crest. Capsule globular black. Seeds 3 about inch through black, outer face rounded, inner one angled.

Borneo, Kudat (1897) Brunei Bay (Bishop Hose).

Allied to *A. melanocarpa* but differing in the very small flowers only  $\frac{1}{2}$  an inch long, the short calyx rounded broad corolla lobes four-lobed lip and crested stamen.

*A. secundiflora* n.sp.

Leaves lanceolate acute one foot and a half long, 2 inches across glabrous, grey above when dry and glaucous beneath, petiole winged  $\frac{1}{2}$  an inch long, sheath transversely wrinkled, ligule  $\frac{1}{4}$  inch long obtuse. Panicle nearly a foot long, with a peduncle over six inches long, bearing several lanceolate sheathing bracts wrinkled transversely, the largest six inches long, branches pubescent short  $\frac{1}{2}$  an inch long, flowers numerous secund. Bracts small ovate  $\frac{1}{2}$  inch long. Calyx tubular one inch long, lobes 3 sub-equal ovate, apices mucronate pubescent. Corolla tube  $1\frac{1}{8}$  inch long narrow funnel-shaped, lobes oblong hooded, Lip shorter than the corolla lobes oblong obtuse rounded with three strong veins. Staminodes flat wing-shaped ending in a linear subulate point inch long. Stamen filament broad, anther oblong not crested. Style slender, stigma cup-shaped.

Selangor. Bukit Hitam (H. J. Kelsall).

A dried specimen of this plant was brought by Lieut. Kelsall from Bukit Hitam some years ago, and it has never been collected since, either there or elsewhere. The tall panicle with narrow flowers all turned to one side of the rachis is peculiar.

*A. mutica* Roxb. Fl. Ind. i. 67. Roscoe Scit. Pl. t. 69.

From 3 to 6 feet tall usually rather slender. Leaves narrow lanceolate very acuminate tapering at both ends glabrous light



green, 18 inches long, and 2 inches across, petiole rather slender one inch long, ligule ovoid blunt  $\frac{1}{4}$  inch long, brownish. Panicle short or long, 3 to many flowered, with several short branches rachis finely pubescent, sometimes nearly glabrous. A long linear green leaf-like bract encloses the whole inflorescence in bud. Bracteoles very small about  $\frac{1}{4}$  inch long oblong white, very soon falling; the one in the uppermost flower often large enclosing the bud. Flowers in threes, pedicel  $\frac{1}{4}$  inch long, as long as the pubescent ovary. Calyx narrowed at the base suddenly dilate above split about  $\frac{1}{2}$  way down, three toothed  $\frac{1}{2}$  inch long white. Corolla tube shorter lobes oblong about an inch long, white upper one oblong ovate lip indistinctly three-lobed, sides turned up, apex truncate crisped, orange with numerous red dots and veins, a raised dark red glabrous swelling at the base on each side. Stamen filament rather short channelled, anther buff,  $\frac{3}{4}$  inch long, thick, apices of cells a little diverging. Stigma cup-shaped. Capsule globose orange-red, very minutely downy, splitting readily in three. Seeds numerous black or dark gray with a sweet white aril, aromatic.

Pulau Aor, and Pulau Dayong (Islands off the East Coast of Johore). (Feilding.)

This plant I have not met with in any part of the peninsula but it has long been cultivated in the Singapore Gardens where it grows very readily. There are two forms, one of which is short, with very narrow leaves, and panicles of two or three flowers, and another much stouter with broad leaves, a larger panicle and almost glabrous fruit. The former is the plant figured by Roscoe, the latter is the form collected by Mr Feilding and is the variety figured by Roxburgh. There is no trace of any staminodes. I found a monstrous flower on one plant with two complete polliniferous stamens, and between them a short linear subulate process, in which apparently the normally developed stamen was rudimentary and the two lateral ones developed. This may be compared with Roscoe's *A. diffusa* which is probably a specimen of this plant with all the flowers like this.

*A. assimilis* n.sp. *A. mutica* Hook. fil. Bot. Mag. t. 6908 (not Roxburgh).

About 6 feet tall. Leaves lanceolate acuminate narrow  $1\frac{1}{2}$

foot long,  $1\frac{1}{2}$  inch broad glabrous dark green petiole 1 inch long, ligule  $\frac{1}{4}$  inch long oblong blunt. Raceme 6 inches to a foot long rachis pubescent, branches few and short. Flowers rather distant. Bracteoles ovate white an inch long, calyx  $\frac{3}{4}$  inch long enlarged upwards, 3 lobed, lobes short, white, corolla tube short  $\frac{1}{4}$  inch long, lobes white upper one obovate obtuse one inch long,  $\frac{3}{4}$  inch wide lower ones smaller, lip obovate obscurely three lobed 2 inches long,  $1\frac{1}{2}$  wide, median lobe rather short crisped orange thickly spotted with red and red veined; a pair of short thick conic fleshy processes thickly pubescent at the base. Stamen filament broadly linear, anther oblong  $\frac{1}{2}$  an inch long. Stigma capitate, slit transverse, ovary very pubescent. Capsule globose hispid orange. Seeds black angular.

River banks and damp spots. Johore, Kota Tinggi. Pahang, Pekan. Penang, Batu Feringgi (Curtis 2766) : Province Wellesley Ara Kudah. Pulau Buru (Island South of Singapore).

This is easily distinguished from *A. mutica* with which it has been confused by the large white bracteoles covering the buds, and the glandular processes at the base of the lip which are distinctly elevated and often of some size and covered especially on the back with stiff silky hairs. The coloring of the flowers and habit of the two plants are quite similar.

*Var. sericea.*

Leaves lanceolate tapering at the base, broader and cuspidate at the apex, scantily pubescent above softly velvety beneath 13 inches long, 3 inches wide, petiole one inch long, ligule very short. Raceme a foot long, rachis silky pubescent, flowers numerous crowded, pedicels inch long silky pubescent. Bracteoles large ovate one inch long and as wide ribbed pubescent, persistent. Calyx short and broad spatheous 3 lobed, lobes cuspidate, pubescent. Corolla tube very short and stout, lobes oblong silky  $\frac{1}{2}$  an inch long blunt. Lip obovate obscurely trilobed an inch long, yellow veined and dotted red apex rounded bilobed, glands at base elevated pubescent.

Cult. in Buitenzorg Gardens (No. 3.)

This plant closely resembles *A. assimilis* but differs in its pubescent velvety leaves, and very short silky calyx and corolla, the bracteole being considerably longer than the calyx which

again is longer than the corolla. It should probably be classed specifically distinct, but for the present I prefer to leave it as a variety of *A. assimilis*.

*A. glabra* n.sp.

Stem unknown. Leaves lanceolate acute, tapering at base, closely ribbed rather stiff and glabrous,  $1\frac{1}{2}$  foot long 3 inches wide petiole 2 to 3 inches finely ribbed, ligule bilobed rounded  $\frac{1}{4}$  inch long. Panicle shorter than the leaves erect lax, lower branches about 3 inches long, glabrous. Bracteoles caducous. Flowers in pairs. Calyx gradually dilated upward,  $\frac{3}{4}$  inch long, lobes short broad truncate pubescent. Corolla tube slender as long as the calyx, lobes linear obtuse hooded  $\frac{1}{2}$  an inch long. Lip oblong boat shaped, apex bifid lobes short blunt,  $1\frac{1}{4}$  inch long. Staminodes short rather thick tapering upwards. Stamen  $\frac{3}{4}$  inch long glabrous, filament rather narrow, crest ovate obtuse quite entire ovary small sub-globose glabrous.

Borneo, Santubong in Sarawak (Dr. Haviland).

This is very distinct from all the others of this section in its lax panicle with stiff spreading branches, the boat-shaped lip and the oval entire crest. The leaves too are much stiffer in texture and the whole plant is almost completely glabrous.

*A. malaccensis* Roxb. Trans. Soc. Linn. VIII 345. is an unfortunately named species. It does not occur here so far as I know but is a native of India. The Javanese and Moluccas plants described as of this species are not *A. malaccensis* but perhaps one of the next two described.

*A. latilabris* n.sp.

Whole plant about 12 feet tall. Leaves glabrous, except the midrib, petiole and ligule, 2 feet and a half long, 3 inches wide narrowly lanceolate tapering at the base, petiole an inch long, ligule sub-acute brown pubescent. Raceme sub-erect, many flowered 6 inches long, rachis stout pubescent very pale green, outer bracts oblong lanceolate blunt 2 inches long 1 inch wide, white tinted with rose. Inner bract ampliate trifid at the apex  $1\frac{1}{2}$  inch long, pinkish white. Pedicels very short white pubescent  $\frac{1}{4}$  inch long, ovary longer, pubescent. Calyx trifid at apex narrowed at base dilate above white tipped with rose. Corolla

tube as long as calyx, lobes very unequal, upper one oblong obtuse  $1\frac{1}{2}$  inch long by  $\frac{3}{4}$  inch wide, lateral ones much narrower adnate to lip. Lip  $1\frac{3}{4}$  inch long and nearly 2 inches across, cordate, lobes not distinct apex narrowed shortly bifid lobes spreading acute; orange densely spotted with red, central bar and veins at apex deep red edge yellow. Stamines curved crimson with a dark spot at base, shaped like the horns of an ox  $\frac{1}{4}$  inch long. Stamen filament broad linear as long as the anther grooved white, base pink, anther  $\frac{3}{4}$  inch long. Fruit globose, orange nearly glabrous.

Pahang, Pulau Datu, on river banks.

This is distinguished from *A. nobilis* by its nearly glabrous leaves smaller panicle and bracts, while the tip though resembling that of *nobilis* in form has much shorter terminal lobes. The fruit too is very different. It has long been cultivated in the Botanic Gardens and from cultivated specimens I take the description. The Pahang plant seems to be the same thing.

*A. nobilis* n. sp.

Stems about 6 feet tall and one inch through pubescent. Leaves oblong cuspidate base oblique 2 feet long, 6 inches wide dark green glabrous above velvety pubescent beneath, petiole stout one inch long brown velvety, ligule inch long bilobed lobes truncate. Raceme about a foot long enclosed in two very large sheath. Bract very large three lobed, lobes nearly separate white tipped carmine, 2 inches long and three across. Calyx one inch long spathaceous white 2 or 3-fid dilated upwards, pubescent. Corolla tube shorter than the calyx lobes oblong obtuse  $1\frac{1}{2}$  inch long one inch wide white silkily hairy especially along the edge. Lip very large  $2\frac{1}{2}$  inch long and 2 inches wide cordate bilobed lobes large oblong obtuse truncate strongly crisped, median bar of lip thickened with four obscure grooves, lateral lobes and disc of lip blood red with yellowish white spots in lines, apex lemon yellow with the nerves elevated crimson. A strong erect hairy keel runs vertically from the disc parallel to the stamen on either side, where are pustular elevations and in some flowers a horn-like spur. Stamen filament half an inch long broad flat pubescent anther very thick as long lobes divaricate at apex, cells brownish. Style longer recurved stigma cup-

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shaped. Capsule round flattened at both ends orange stiffly hairy. Seeds numerous. Cultivated in the Botanic gardens 1888-1898 fl. November.

Pahang, Kwala Tembeling. Selangor, Ginting Bidai.

This superb plant has long been cultivated in the Botanic Gardens, but whence it was obtained is quite uncertain. It is the largest species known to me, and very distinct in its large white triple bracts tipped with pink, and its deep blood-red lip very broad and ending in two oblong undulated lobes. The leaves are remarkably velvety beneath.

*A. Rafflesiana* Wall. Cat. 6575. Baker l.c. 255.

Stems about 4 feet tall slender, leaves lanceolate cuspidate pubescent, 12 inches long by three wide, petiole  $\frac{1}{2}$  an inch long, ligule oblong sheaths pubescent. Panicle short and compact, 2 to 4 inches long. Bracts oblong short. Calyx short, dilated upwards, mouth oblique red. Corolla tube nearly twice as long, lobes broadly lanceolate orange tipped red  $1\frac{1}{2}$  inch long. Lip longer, broadly ovate sides upcurved, orange with darker veins. Staminodes two short deep maroon toothed processes. Stigma filament linear fleshy, anther oblong retuse. Style longer than stamen, stigma rounded. Capsule globose green  $\frac{3}{4}$  inch long pubescent.

Singapore, Sungei Buluh; Changi; Tuas. Johore, Tanjong Bunga; Gunong Panti; Ulu Batu Pahat. Malacca, Sungei Hudang. Selangor, Bukit Hitam; Bukit Kutu. Perak, Dindings, Telok Sera; Maxwell's hill, Gunong Keledang.

This pretty plant easily distinguished by its short panicle of entirely orange colored flowers, occurs all over the peninsula from Singapore to Perak, inhabiting woods up to an attitude of 4000 feet. It is called Pua Munkang, and Tepus Kijoi. This plant commonly known as *Alpinia vittata* of Gardens, is quite different from this, which I believe is not in cultivation at all.

*A. comosa* n. sp.

Stems slender 6 to 10 feet tall, slender terete dark green. Leaves narrow lanceolate acuminate with long points edges serrate with short stiff hairs at the apex, about a foot long and

$1\frac{1}{2}$  to 2 inches across deep polished green, petiole none, ligule very short rounded. Raceme terminal erect standing at right angles to the stem about 6 inches long dense, rachis pubescent. Bracts conical cup-shaped acute white, falling off before the flower opens. Flowers numerous medium size on pedicels long. Calyx spathaceous white  $\frac{1}{2}$  an inch long. Corolla tube, infundibuliform white, a little longer, lobes oblong pubescent  $\frac{1}{2}$  inch long, nearly  $\frac{1}{4}$  inch wide at the base obtuse, upper one hooded, white. Lip about  $\frac{3}{4}$  inch long with broad upturned sides and a narrow deflexed apex minutely bifid rather stiff pubescent median bar thickened fleshy polished, white with a pale yellow base, a bar of deep crimson dots at the base on each side. Staminodes, inch long spatulate with a broad rounded apex rather stiff white with a patch of deep crimson dots. Stamen filament linear  $\frac{1}{2}$  inch long white. Anther  $\frac{1}{4}$  inch long white a small but distinct oblong rounded crest longer than the stigma pubescent, stigma capitate green. Capsule cylindric 2 inches long  $\frac{1}{2}$  inch thick strongly ribbed, brownish ochre colored.

Kedah Peak in forests; cultivated in the Botanic Gardens it flowers in March.

This is a most aberrant plant. The bracts in the form of tall conical caps falling off as the flowers open, the large broad flat staminodes and the very curious long narrow fruit make it quite unique. It is very difficult to compare it with any other species, but it should probably belong to the *Hellenia* section.

*A. involucrata*. Griff. Notul. iii. 422. *Costus malaccensis* Koen. Retz. Observ. iii. 71.

Stems about six feet tall and half an inch through. Leaves oblong acuminate cuspidate 18 inches long by six inches wide glabrous above and softly pubescent below, petiole  $1\frac{1}{2}$  inch long purple brown pubescent, ligule bifid to the base lobes oblong truncate with hairy edges. Panicle pendulous short. Bracts oblong white at first but brown and withered before the flowers open. Floral bracts cup-shaped white  $\frac{1}{2}$  an inch long, encircling two or three flowers. Calyx tubular dilated upwards  $\frac{3}{4}$  inch long, glabrous with three short bosses representing the divisions. Corolla tube thick, upper lobe oblong prolonged to a blunt point,  $1\frac{1}{2}$  inch long, lateral lobes shorter, oblong blunt all white pubes-

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cent at the base and hooded at the apex, with a scarious margin. Lip ovate broad trumpet-shaped margins denticulate otherwise entire (rarely obscurely lobed) 2 inches long,  $1\frac{1}{2}$  broad orange with crimson spots and veins at the base, edge white. Stamens irregular short with two or three points crimson. Stamen filament  $\frac{3}{4}$  inch long pubescent, anther very thick,  $\frac{1}{2}$  an inch long pubescent, apices of cells separate, no crest, cells linear narrow. Style abruptly recurved at the apex, ovary silky. Capsule globose green. Shady woods and banks.

Johore, Gunong Panti. Malacca very common. Muar (Feilding). Selangor very common especially near Kwala Lumpur. Perak, Larut, Ipoh, (King 2296) Waterloo. Also at Sungei Kalantan, Siak in Sumatra.

Though Baker classes this as near *A. nutans*, Roxb. it is very different in many points. The curious cup-like bracts round the flowers, the hooded petals, the thick nearly cordate anther, and short compact panicle make it quite peculiar. The flowers are fertilized by a brown humble bee, and seldom fail to produce fruit, which is always green, never becoming orange as in other species. It is called Poko Gingin, and Kantan hutan by the Malays. A variety occurs in the Kinta valley at Ipoh and Bujong Malacca in which the flowers are colored as in *A. capitellata* with the calyx, tips of corolla and centre of lip red.

*A. capitellata* Jack Hook. Journ. Bot. i, p. 360.

Stems over six feet tall or more one inch through purplish brown pubescent. Leaves oblong cuspidate edges pubescent 2 feet long, 4 inches wide, petiole 3 inches long or less pubescent ligule large and hairy. Inflorescence a nodding obconic head 4 inches across, with very large ovate cuspidate thin bracts the lower ones three inches long and wide. Bracteoles short rounded cup-shaped, much shorter than the bracts. Flowers almost sessile hardly protruding. Calyx  $\frac{1}{2}$  an inch long, much dilated upwards with the base wider than the pubescent yellow, ovary ( $\frac{1}{4}$  inch long) obscurely three-lobed, the lobes rounded red. Corolla tube a little longer than the calyx lobes stiff, upper one an inch long and  $\frac{3}{4}$  inch wide hooded with a stout blunt mucro which with the centre is red, the rest white lateral lobes obovate blunt the apex in the centre raised to a

boss red. Lip obovate with a bifid apex, sides convolute, edges crisped  $1\frac{1}{2}$  inch long by 2 wide, edge white, centre orange, thickly dotted with dark red, dots in lines. Staminodes adnate to the edges of the lip and to the base of the filament, short sub-acute deep brown pink shining. Stamen 1 inch long filament  $\frac{1}{8}$  inch wide glabrous yellowish, anther deeply emarginate pubescent yellow with pink dots on the back. Style as long as stamen, apex decurved, stigma sub-triangular with a linear slit. Capsule globose minutely pubescent green.

Woods, Province Wellesley, at Ara Kudah; Dindings, Gunong Tungul. A fine plant closely allied to *A. involucrata* but quite unique in its large obconic capitula of flowers, with very large bracts at the base.

Jack's description as far as it goes fits this plant very well, but it is not very complete. He obtained his plant at Bencoolen in Sumatra.

#### § *Cenolophon*.

- A. vitellina* n. sp. *Cenolophon vitellinum* Horan. Prodr. 36.  
*Amomum vitellinum* Lindl. Journ. Hort. Soc. ii. 245. Bot.  
 Reg. 1847, t. 52.

Rhizome stout branched. Stems numerous 3 to  $3\frac{1}{2}$  feet tall  $\frac{1}{2}$  an inch through dull green flattened and ribbed. Leaves lanceolate acuminate 10 inches long 3 inches across, dark green, petiole less than  $\frac{1}{2}$  an inch long ligule rounded usually split  $\frac{1}{2}$  an inch long edged with rufous fur, sheath deeply split. Panicle terminal with few branches much shorter than the leaves compact, about 4 inches long, rachis pubescent. Bracts narrow linear caducous 3 inches long green. Flowers sessile or nearly so. Calyx tubular green one inch long pubescent trifid split. Corolla tube as long as the calyx, yellow, lobes linear blunt erect, yellow one inch long, posticous one hooded. Lip longer than corolla flat oblong cuneate bifid at apex edges crispid, orange veined with darker color, and sprinkled with red dots, stamen filament shorter than lip flat pale orange. Crest very large three-lobed toothed. Staminodes two short red horn-like processes.

Penang Hill. Selangor, Dusun Tua.

This species was first described from a plant sent to Chiswick



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Gardens, and stated to have come from Ceylon, which was evidently an error. It has been referred to *Amomum*; and to a new genus *Cenolophon* apparently on account of the well developed anther crest. It is however in every other respect a typical *Alpinia*. The lip being not rolled up as in most of this genus so as to enclose the stamen, the anther crest is strongly developed so as to direct the fertilizing insect to the nectary.

A specimen labelled *A. Wrayi* from Dr. King evidently belongs to this species, but the description in the Flor Brit. India does not at all agree with *A. vitellinum*, *A. Wrayi* being classed with the crestless *Alpinias* and compared to *A. calcarata*. I have therefore retained the highly appropriate specific name given by Lindley.

*A. cannaefolia* n. sp.

Stem stout 4 or 5 feet tall. Leaves ovate or oblong ovate narrowed at the base, apex broad cuspidate, glabrous one foot long, 6 inches wide, petiole 4 inches long. Raceme erect about 6 inches long, peduncle a foot or less, pubescent. Bracts linear, lowest one as much as a foot long,  $\frac{1}{4}$  inch broad green, persistent. Flowers numerous pedicels very short pubescent  $\frac{1}{2}$  inch. Bracteoles very small. Calyx dilate trilobed, pubescent  $\frac{1}{2}$  inch long, lobes blunt tipped with hairs. Corolla tube slender, as long, lobes linear one inch long, blunt. Lip more than an inch and a half long oblong entire edges crisp. Stamens none. Stamen one inch long, filament broadly winged pubescent, anther narrow, crest large three-lobed, median lobe much the largest oblong crisped. Style much shorter than crest ovary villous. Fruit oblong thick pubescent. Seed very large 2 or 3 only oblong  $\frac{1}{4}$  inch long smooth black.

Selangor, Dusun Tua. Negri Sembilan, Bukit Sulu; Gunong Berumbun.

This resembles *A. vitellinum* but has very much larger leaves broader and thicker. The bracts at the base of the inflorescence are remarkably long and narrow and the ovary very villous. The plant is known to the Malays as Pua Minyak and used in medicine, a decoction of the leaves and roots being given in fever.

*A. petiolata* Bak. l.c. 255.

Plant about 3 feet tall, leaves few elliptic oblong narrowed at the base, long acuminate glabrous about 15 inches long and four wide, petiole 3 inches long, ligule  $\frac{1}{4}$  inch long glabrous. Raceme slender pendulous, 6 inches long about 20 flowered pubescent, pedicels very short  $\frac{1}{2}$  inch long. Bracts narrowly linear  $\frac{1}{4}$  inch long or less. Calyx as long as the corolla tube  $\frac{1}{2}$  inch, 3 lobed, lobes acute, white polished glabrous, except the lobes tipped with hairs. Corolla lobes oblong linear one inch long yellowish white pubescent hooded, sub-equal. Lip flat, (not rolled up) entire obovate, edges crisped  $1\frac{1}{2}$  inch long, base pale yellowish, central barred, apex orange with red veins. Staminodes absent. Stamen filament linear oblong, anther broader, crest reniform undulate dentate emarginate, the centre fleshy deep red. Style projecting, stigma ovoid slit terminal large, ovary hispid. Fruit fusiform 2 inches long hairy.

On rocks and banks. Perak, Maxwell's Hill. Selangor, Bukit Kutu.

This has the largest flowers of any in the section, and is a rather handsome plant.

*A. macrostephanus* Rid. *Amomum macrostephanum* Bak. l.c. 243.

Stem "very slender 4-8 feet." Leaves narrowly oblong, base rounded cordate, lobes very unequal, apex acuminate glabrous 2 feet long, 3 inches wide petiole slender 5 inches long. Spike "3-4 inches long" peduncle long erect enveloped in the sheath of the topmost leaf. Bracts caducous ovary villous. Calyx  $\frac{1}{2}$  inch long dilated bilobed, lobes rounded, pubescent. Corolla tube shorter slender, lobes linear minutely pubescent  $\frac{3}{4}$  inch long. Lip oblong obtuse rather narrow, a little longer edges crispid. Staminodes short linear obtuse. Stamen shorter than the lip filament rather slender, anther hairy, crest very large three-lobed lobes truncate plicate.

Perak Hills, Larut Hills. 500-1000 feet (Dr. King's Collector).

## MARANTACEAE.

This group abundant in South America is very restricted here, being represented by only 8 species belonging to two

genera. *Donax*, of which there are two species, is a tall stemmed plant much branched with ovate leaves, and slender panicles of white flowers, on zig-zag branches. *Phrynium*, is stemless, the leaves are usually large and long-stalked produced from the rhizome, the inflorescence, of simple or compound spikes, produced directly from the root stock or from the side of the petiol. There are six species.

*Phrynium variegatum* Hort, is an ornamental variety of the common arrowroot, *Maranta arundinacea* L. which has been cultivated in the Botanic Gardens Singapore for many years and was thence introduced into European Gardens, but its original home is lost.

*Donax grandis* Ridl. *Clinogyne grandis* Benth. Gen. Pl. iii. 651.  
*Maranta grandis*. Miq. Fl. Ind. Bat. Suppl. 616.

A very large plant growing 15 feet or more high with smooth green bare stems an inch through, and eight feet tall, branches clustered and jointed on a thickened portion of the stem, arranged spirally thickened at the base and spreading. Leaves ovate acute a foot long and six inches wide base rounded glabrous dark green, the large nerves distinct, petiole an inch long, sheaths six inches or more, no ligule. Racemes slender numerous hanging from the upper leaf axils, about a foot long, rachis slender zig-zag. Bracts narrow lanceolate acute. Flowers rather distant opening singly white shortly pedicelled. Sepals lanceolate acuminate  $\frac{1}{8}$  inch long white pubescent. Corolla tube  $\frac{1}{4}$  inch, lobes as long lanceolate acute. Lip yellow oblong obovate obtuse with a large ridge towards the base. Stamen petaloid oblong, cucullate one broad with a large curved side lobe, antheriferous one very narrow linear. Style short. Fruit globose white  $\frac{1}{2}$  inch long. Seed single (rarely 2) light brown globose with a groove on one side.

In woods. Common in the peninsula from Tenasserim to Singapore. Singapore, Bukit Timah, etc. Johore, Sungei Ulu Sembrong. (Lake and Kelsall) Malacca, Bukit Sedanan, Pan-chur, Tampin, Sungei Udang. Negri Sembilan, Tampin, Berumban. Pahang, Tahan river. Selangor, Caves Kwala Lumpur. Perak, Thaiping Hills, Telok Sera, Dindings. Siam, Bangtaphan

(Dr. Keith). Borneo, Rejang (Dr Haviland). "Bemban" of the Malays. The stems are used for making baskets.

*Donax arundastrum* Lour. Flor. Cochinchinensis p. 15. *Clinogyne dichotoma* Salisb. Trans. Hort. Soc. i. 276. *Phrynium dichotomum* Roxb. As. Res. XI, 324. *Maranta dichotoma*, Wall. Cat. 6614. *M. ramosissima* Wall. 6615.

Stems numerous about 8 feet tall nearly an inch through, branches dichotomous terete thickened at the base deep dull green, sheaths at the joints lanceolate persistent. Leaves elliptic base rounded apex acute, petiole thick  $\frac{1}{4}$  inch long, sheaths sub-terete no ligule. Panicle 2 to 8 inches long erect or nearly so, with few branches. Branches slender zig-zag. Bracts lanceolate involute green one inch long. Flowers white opening one at a time, two to a bract. Pedicels short with a small ochre-yellow conic gland some way below the ovary. Sepals spatulate the upper one the largest  $1\frac{1}{2}$  inch long  $\frac{1}{4}$  inch wide at the top free nearly to the base, the lower ones narrower and more acute joined to the corolla tube for half their length. Petals linear obtuse. Lip small spatulate apex rounded bilobed with a tongue-shaped process in the mouth and a line of hairs down the centre. Petaloid stamen  $1\frac{1}{2}$  inch long bilobed lobes rounded  $\frac{1}{2}$  an inch across. Antheriferous stamen adnate to lip with a slender filament and narrow anther. Cucullate stamen bilobed at the apex. Style stout stigma horse-shoe shaped. Fruit globose.

Common on river banks in thickets. It is called "Bemban Ayer." Johore, Kota Tinggie. Pahang, Pekan and a long way up the river. Kelantan, Kampos. Selangor, Langat. Perak, Kinta river (King 831); Ipoh. It occurs also in India, Siam (Bangtaphan, Dr. Keith) and the Eastern islands. (Celebes, Dr. Koorders).

Loureiro's description might very well and even better apply to the last species, but he quotes Rumphius' picture (Herb. Amboinense Book 6, t. 7. which is evidently this species. His name *Arundastrum* is quoted in the Flora of British India as *Arundinastrum*. It is *Arundastrum* in the two editions I have here. The plant is much smaller than *D. grande* but has larger flowers.

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### PHRYNIUM.

*Ph. Griffithii* Bak. l.c. 260. *Ph. spicatum* Griff. Notulæ iii. 418. (non Roxb.) *Hitchenia musacea* Bak. l.c. 225. *Curcuma musacea* Wall. Cat. 6596.

Plant forming very large tufts, about five feet tall. Leaves erect blade oblong subacute 2 feet long and 6 inches wide above light green beneath glaucous except along one edge quite glabrous, petioles long and slender three feet tall. Spikes from the base 4 to 6 inches long flattened on a peduncle about the same length. Bracts whitish distichous, the edges connate at the base with the points recurved cartilaginous, 2 inches long and  $1\frac{1}{4}$  broad. Flowers in pairs, each pair enclosed in a thin white oblong bract flattened and thickened on one side. Pedicel short. Calyx split nearly to the base lobes narrow acuminate acute white thin and transparent, hardly  $\frac{1}{2}$  an inch long. Corolla tube slender  $\frac{1}{2}$  inch long, lobes oblong oblanceolate blunt reflexed white nearly  $\frac{1}{2}$  an inch long. Stamen tube little longer than corolla tube, the petaloid stamen is so deeply cleft as to appear to be two organs each lobe is spatulate with a claw with two involute edges and a broad expanded limb. Cucullate stamen rather narrow, the apex of the hood rather acute, the lateral lobe short and blunt, the edges yellow. Lip oblong obovate blunt rather fleshy the crest not transverse as usual but almost parallel with the line of the lip short thick and tongue-shaped, a long hairy ridge runs along the lower part of the lip in the same direction. Style very stout rounded on the back and doubly grooved in front. Stigma depressed almost funnel shaped. Capsule an inch long, fawn-colored back rounded front keeled, 2 seeded, seed oblong with the back rounded and front flat, a small irregular white aril at the base.

Dense woods. Singapore, Bukit Timah, Jurong, etc. Johor, Gunong Panti, Malacca, Bukit Bruang. Negri Sembilan, Bukit Tampin. Pahang, Tahan river.

A common plant in the South. The flowers have a very sweet scent.

*Ph. cylindricum* n. sp.

A large tufted plant in the habit of *P. Griffithii*. Bak.

Leaves about six feet tall, blade oblong ovate base broad two feet long and 8 inches wide glabrous green above whitish beneath, petioles four feet long. Scapes rather slender about 8 inches long, spikes narrow fusiform six inches long. Bracts pale green ovate oblong truncate glabrous apices erect not recurved, reflexed and spreading in fruit. Flowers white, corolla tube  $\frac{1}{4}$  inch long, lobes oblong. Lip fleshy ovate acute sides turned up. Cucullate stamen short truncate with a process on the side, white tipped with yellow. Petaloid stamen hooded, antheriferous one very narrow linear. Style stout.

Perak in the Kinta valley on the limestone rocks at Ipoh, and Kwala Dipang.

Closely allied to *P. Griffithii* but readily distinguished by its much more slender cylindric spikes.

*Ph. jagorum* Koch. Wochenschrift. VI (1863) p. 358.

Rather a small kind often forming masses on the ground. Leaves solitary or two or three, the blade 6 to 7 inches long, oblong cuspidate 3 inches across, glabrous except the midrib on the back which is pubescent, grey green with darker patches running from the midrib above, or entirely light green, petiole 8 or 9 inches long slightly flattened upwards, the swelling below the blade pubescent. Flower spike from the root stock 2 inches long fusiform slender on a terete peduncle an inch long. Bracts about 4 green lanceolate acute. Flowers in pairs. Sepals lanceate acuminate acute inch long green. Corolla tube long slender dilated upwards  $\frac{1}{2}$  an inch long white, lobes short oblong yellow. Stamen tube no longer than corolla tube. Cucullate stamen nearly entire hooded oblong with a lateral process apex orange, anther-bearing one petaloid with a rounded lobe on a linear base, anther on a narrow lateral lobe; petaloid one narrow linear oblong. Lip more fleshy oblong rounded edges incurved, glabrous, with a rounded process on one side on the inner face and a narrow linear lobe outside. Style very stout thickened in the middle. Capsule oblong oblique crustaceous green 2 seeded inch long. Seeds elliptic oblong with a rounded back and flattened and grooved ventral surface brown polished, the aril at the base oblong reddish with two long curved claws.

Selangor, Dusun Tua; and near Kwala Lumpur.

I have also I believe seen the plant in Malacca. The foliage is prettily marked and resembles that of some of the South American Calatheas. The flowers are not often produced and are very inconspicuous. The seeds have a very odd appearance, resembling some curious beetle, the seed itself representing the body, and the claw-like arms of the aril the legs of the animal. The plant was first described from living plants sent to Bertin from the Malay peninsula by Professor Jagor.

*Ph. tapirorum* Ridl. Trans. Linn. Soc. iii. 382.

A large tufted plant about six feet tall, leaves ovate, lanceolate blade 18 inches long, 8 inches wide, acuminate green. Spikes in a tuft from the side of the petiole with a stout peduncle two or three in a tuft about 4 inches long, with numerous ovate lanceolate brown bracts. Flowers white on short peduncles, 3 in each bract, an inch long. Bracteoles 2 thin bifid. Sepals linear subulate more than half an inch long. Corolla white tube curved dilated upwards rather thick, lobes oblong, apices rounded blunt recurved. Capsule oblong obtusely 3 angled  $\frac{1}{2}$  inch long, three celled with a seed in each cell. Seeds narrow oblong.

Selangor at Ginting Bidai. Pahang, Tahan River.

The tuft of long spikes projecting from the side of the leaf stalk distinguishes this from any of our other species.

*Phrynium malaccense* n. sp.

A large tufted plant. Leaves tall about 3 feet, petiole terete glabrous, except at the base 8 inches long inch thick, blade 15 inches long, 5 inches wide, lanceolate cuspidate dark green above, glaucous green beneath, nerves very close and numerous, midrib thick covered with brown fur, otherwise glabrous. Head lateral from the petiole dense 2 inches across, with about 4 branches. Bracts lanceolate acute stiff hard green glabrous  $1\frac{1}{2}$  inch long,  $\frac{3}{4}$  inch wide. Flower spikes 5 or 6 on each branch, with 2 or 3 flowers in each spike. Bracteole lanceolate acute 1 inch long green. Flowers small fugacious, shortly stalked, stalk inch long. Calyx tube very short lobes lanceolate acute white hispid nearly as long as the corolla tube. Cor-

olla tube dilated upwards, lobes ovate blunt, recurved finely spotted with purple. Lip thin spathulate oblong, white with a transverse pink line across the apex. Stamens, the cucullate one falcate spathulate white the hood edged with yellow, the petaloid one obovate bilobed rounded white, the antheriferous one linear erect short. Style thick flattened behind. Stigma ovoid, ovary orange covered with white hairs. Capsule one to three angled cordate in outline a little over  $\frac{1}{4}$  inch long red hairy. Seeds oblong angled black covered with a semi-transparent aril.

Common in woods in the hilly districts of the peninsula. Malacca, Bukit Danan, Panchur. Negri Sembilan, Bukit Muar. Selangor, Caves Kwala Lumpur, Pataling. Dindings, Gunong Tungul. Perak, Maxwell's Hill. Pahang, Tahan Woods.

This is allied certainly to Roxburgh's *P. parviflorum*, with which it has been confused, but that has yellow flowers, and only one seed in the capsule.

*Ph. hirtum* n.sp.

A plant forming fairly large tufts. Leaf stems stout 3' or 4 feet tall, blade broadly oblong with a broad base, apex acute 15 inches wide, 8 inches across, glabrous dark green young leaves with the backs red. Petiole 15 inches long, stout sheath near the inflorescence woolly. Head of flowers three inches through. Bracts oblong  $1\frac{1}{2}$  inch long apex, broad truncate broken up into fibres. Bracteoles lanceolate acuminate acute glabrous. Peduncles nearly  $\frac{1}{4}$  inch long. Flower  $\frac{3}{4}$  inch long (white). Calyx sepals free almost to the base longer than the corolla linear lanceolate acuminate hispid. Corolla tube rather slender, lobes oblong lanceolate acute tipped with hairs. Lip oblong small. Stamen, cucullate with rather a long lateral process. Style very stout. Capsule globose obscurely three lobed glabrous  $\frac{1}{2}$  an inch long. Seeds 3 large, the backs rounded sides straight and smooth.

Johore, Gunong Panti. Sungei Ujong. Selangor, Dusun Tua. Perak, Hermitage Hill; Ulu Kerling (King's collector). Penang, Government Hill (Curtis 2420).

A much stouter plant than *P. malaccensis* with larger leaves, hairy leaf sheath, and very different fruit.



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### *Ph. basiflorum* n.sp.

Rhizome rather long, leaves in a tuft on a very stout woolly stem, about 4 feet long, oblong base broad, apex cuspidate glabrous except margin hispid, finely striate. Capitulum large 3 inches through from the base of the stem between the leaves dense many flowered. Lowest bracts woolly inner bracts glabrous oblong lanceolate. Flowers in pairs. Calyx lobes free to the base linear setaceous  $\frac{3}{4}$  inch long. Corolla tube a little longer lobes oblong lanceolate dark pink  $\frac{1}{2}$  an inch long. Lip white ovate oblong broad  $\frac{3}{8}$  inch long and broad, ridge large elevated rounded. Stamen narrow linear, ovary pubescent.

Negri Sembilan. Woods in Perhentian Tinggi, growing in large masses in damp spots.

### CANNACEÆ.

*Canna indica* var. *orientalis* and *C. Warscewiczii* have established themselves in Kampongs and waste ground near towns in Singapore and a few other spots, but have no claim to be considered native anywhere in the peninsula.

### MUSACEÆ.

The genus *Musa* is the only one of this group represented here, though farther east from Amboina to New Ireland are various species of the genus *Heliconia* several of which are cultivated in our gardens. The general form of the Banana is so well known that it is unnecessary here to give a special description of it. Three and probably more wild kinds occur in the peninsula, one of which *Musa Malaccensis* appears to be the parent of some of our cultivated bananas.

*M. Malaccensis* Ridl. Trans. Linn. Soc. iii. p. 383.

Stems rather slender about 10 feet tall and 6 inches through. Leaves about 8 feet long green, often barred with brown when young. Spike decurved rachis covered with brown hairs. Bracts lanceolate sub-acute brown. Male flowers  $1\frac{1}{2}$  inch long curved white. Calyx boat-shaped with five teeth. Petal oblong white  $\frac{3}{4}$  inch long. Stamens with flattened filaments and narrow anthers. Female flowers 16 in a row. Stamens  $\frac{1}{2}$  an inch long abortive. Style thick, an inch long. Fruit sub-

cylindrical four inches long yellow. Seeds black angled, enclosed in an eatable pulp.

Common all over the main chain of the peninsula. Malacca, Selangor, Perak, Pahang.

*M. flava* Rid. l.c.

Leaves large 16 inches across green. Spike decurved pubescent. Bracts widely ovate obtuse 4 inches long, bright yellow. Male flowers 16 in each bract arranged in two rows much like those of the preceding. Females also 16 in two rows. Fruit about 2 inches long, five angled.

Pahang at Pulau Tijau, Pahang River.

The very blunt spikes with yellow bracts distinguish this rare kind readily.

*M. violascens* Rid. l.c. 334.

Stems 8 to 10 feet. Leaves 10 inches across transversely ribbed and whitish beneath. Spike erect or nearly so, apex acute. Bracts lanceolate narrow acute violet or white tinted with violet, nine inches long and 2 inches wide, often persisting and reflexed after the flowers have fallen, rachis pubescent. Male flowers 6 in a single row in each bract, about an inch long. Females also 6 in a row. Fruit 3 inches long green, uneatable seeds  $\frac{1}{4}$  inch long cylindric.

Common all over the main chain of the peninsula, often growing with *M. Malaccensis*. Pahang, Perak, Selangor, Sungei Ujong.

Easily recognized by its acute erect spikes with bracts colored like a purple brinjal.

#### LOWIACEAE.

A small group of plants forming a single genus *Lowia*, very unlike any other *Scitamineæ*, being stemless with broad dark green leaves like those of a *Susum*, and a short prostrate panicle of flowers from among the leaves. The flowers are medium size or large with a long almost solid calyx tube three long calyx lobes, two very small petals and a large obovate lip, five very short stamens, and a short stout style ending in a three-armed stigma. Capsule large, fusiform acute with numerous flask-shaped pubescent seeds.

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There are two species in the peninsula and one in Borneo.

*L. longiflora* Scortechini, Nuov. Giorn. Bot. Ital. 1866, p. 308.

A large plant forming great tufts with erect dark green lanceate acute leaves, about 3 feet long and 4 inches wide tapering into the petiole. Flowers axillary enclosed in long sheaths solitary large. Calyx tube long, sepals 5 inches long and one across narrow linear acute purple. Petals one inch long yellow linear acuminate apex setaceous. Lip spatulate the limb ovate, 4 inches long and 2 inches across lilac. Stamens as long as petals, filaments short curved, rather thick, anthers. Style long and slender, longer than the stamen. Stigma arms linear with numerous processes at the ends.

Selangor, Ulu Langat, near the caves Kwala Lumpur. Perak, Ipoh.

This plant is exceedingly abundant in some places, forming great masses, usually in wet spots, but growing also in drier ones. It is however rare to find flowers, and I have only found them on plants which have been injured. They are not very conspicuous, being usually concealed among the leaves. It is known as "Lobak hutan" in Selangor.

*L. maxillarioides* Hook fil. Bot. Mag. t. 7351. *Protamomum maxillarioides* Ridl. Trans. Linn. Soc. iii. 383.

A smaller plant with numerous leaves in a tuft arranged distichously, lanceolate acuminate 8 inches long and 3 inches wide bright green, petiole 2 feet long sheathing at the base, often shorter. Panicle axillary about 3 inches long with a few shorter branches. Calyx tube purple 3 inches long, lobes (sepals) lanceolate acute deep purple spreading  $1\frac{1}{4}$  inch long. Petals two very small oblong mucronate violet. Lip with a short claw, oblong obtuse white tinted with violet. Stamens short, filament thick curved, anthers but little longer. Style thick and short. Stigma large (in proportion) subcordate with three short toothed arms. Capsule large  $1\frac{1}{2}$  inch long, fusiform pointed three angled, deep purple. Seeds  $\frac{1}{4}$  inch long, flask-shaped brown, covered with short hairs.

Pahang, Pulau Tawar Woods.

Abundant there but I have never seen it elsewhere.

## The Habits of Malay Reptiles.

BY H. N. RIDLEY.

In putting together these few notes on the habits of some of our reptiles, I would commence by calling attention to the very valuable paper on the Reptiles and Batrachians of the Malay peninsula by Lieut. S. S. Flower, published in the Proceedings of the Zoological Society for December, 1896, page 856. This paper gives a list of all species recorded from this country, and I have made much use of it. The earliest important paper on the subject is that by Dr. Cantor, published in 1847, and a good number of kinds mentioned by him have not been met with since. Some were perhaps erroneously identified or wrongly localised, and some perhaps have disappeared. Others, however, have doubtless been overlooked, and that is especially the case in the tortoises, and the smallest lizards. Snakes are often preserved by amateurs, as are the showier lizards, but the other reptiles often escape collection. No better instance of this is that of the big Gavial *Tomistoma*, which was really first recorded as belonging to our fauna in 1896, by Wray, although it appears to be by no means rare in the Pahang and Perak rivers, and must at times have been the victim of the sportsman long ere this.

### TORTOISES.

There are several kinds of land tortoises to be met with here, and one of the commonest is the jungle tortoise *Geomyda spinosa*. It is rather a small tortoise about eight inches long, and of a dull red colour, just the colour of the rotting leaves in the streams of the jungle where it lives. Its head and feet are black, with pink spots. When young the edge of its shell is armed with spiny processes, whence its name, but these disappear as it grows older. It seems never to leave the damper parts of the forests, and is seldom far away from the small streams. These tortoises eat all kinds of vegetable substances, fruit of all kinds and leaves, and I once found two small ones greedily devouring

a fungus. Their tenacity of life is, as in most tortoises, very great. I once brought one from Bukit Timah, where they are common, for the Museum, and on preparing its skeleton it was found that by some accident the carapace had broken clean across, and though the edges had not joined, the damage had been evidently repaired as well as possible some time previously. Afterwards I heard that some visitors to the bungalow had found one of these tortoises and carried it up to the top of the turret, whence it had fallen upon the gravel path, and though it seemed much injured, it managed to creep away, and I have little doubt that this must have been the same tortoise which had thus recovered from this severe injury.

*Cyclemys platynota*, the flat-backed tortoise, is a rather larger animal, recognised by a peculiar flattening on the top of its shell. It is usually a very shabby, disreputable looking animal, with a dirty brown irregular carapace. It is less often noticed, as it is even more aquatic than the jungle tortoise, remaining under water most of its time. It seems to be abundant in the river at Selitar bungalow, where Dr. Hanitsch got several, and it has turned up in the Botanic Gardens, once in the Lake and once in a smaller pond, where it was devouring the waterlilies. In captivity it will eat rice, fish, leaves or fruit.

The box-tortoise, *Cyclemys amboinensis*, is very common in the rice fields in Malacca, and used to be common in Singapore, but is now getting scarce here, as its haunts are being either drained or cultivated or built on. I have been told that it was formerly plentiful on the ground on which is now the Tanglin Market. It is a very pretty little tortoise with a very round back, black and smooth, the lower carapace yellow, and its head black with a bright yellow band on each side. The end plates of its under shell are jointed upon the others, so that it can close itself entirely within its carapace if alarmed, whence its name of box-tortoise. It is very fond of the water and often remains therein, only projecting its snake-like head above the surface. However, it often leaves the water and rambles about, especially in the evening, in search of food, and I have seen them run over by bullock carts on the roads in Malacca. They are very easily kept and are quite omnivorous, eating fish, boiled

rice, frogs, fruit, and green vegetables with equal pleasure. They lay rather large, oblong, blunt-ended, white eggs, two or three, or as many as five at a time, which they bury in the sand. The shell is remarkably hard for a reptile's egg, and the eggs, two inches long, are very large for the size of the tortoise.

The large land-tortoise, *Testudo emys*, does not occur in Singapore, but is not very rare in Perak, especially in the Dindings, and is said to occur in Penang also. I got a very fine female at Telok Sera, in the Dindings, which laid two eggs shortly after I got it. They resembled those of the box-tortoise, but were larger. This tortoise lives in the drier parts of the woods, and does not seem to care about water at all. It eats all kinds of leaves voraciously.

Several kinds of snapping-turtles (*Trionyx*) are recorded from the peninsula, but the commonest is *Trionyx cartilagineus*, a very large flat turtle, the shell of which is covered with a leathery, dark gray skin, often marked with olive spots, and which is continued as a flange all round the shell. The head and neck are gray with small yellow spots, and the snout is long and pointed, giving the animal a very ugly appearance; the feet are very thick and powerful, ending in sharp claws.

These turtles usually live in tidal rivers, but sometimes get into ponds. They rarely leave the water, but may be seen pushing up their heads above the surface from time to time. One was caught in the ditch by the Museum some years ago, and was transferred to the Gardens' lake, where it eventually became very large, and attacked some of the water birds with great ferocity, killing and devouring some flamingoes. It was eventually trapped and destroyed. Though these animals are properly carnivorous, they seem very fond of boiled rice, and the ones in the Garden lake used always to come and feed off the rice put down for the water fowl, and those in captivity are fed for the most part on boiled rice made up in balls. The Chinese are very fond of these turtles, and their flesh fetches a high price in the markets. The Malay name for them is *Labi-Labi*.

The Chinese have a superstition about tortoises, which they consider emblems of longevity, the tortoise, with the dragon and phoenix being the first three animals in the world when it was created. They catch or buy as many tortoises of

any kind as they can get, and after writing their name on them release them in a suitable spot. These tortoises are supposed to bear away the sins of the men whose names they bear, and no Chinaman will kill or buy a tortoise so inscribed for fear of being burdened with the sins of some one else. This probably accounts for the appearance of a considerable number of turtles and of the flat-backed tortoises in the Gardens lake, within late years, and the temple of tortoises in Penang is also used as a place of safety for sin-bearing tortoises.

In the seas round the peninsula four kinds of turtles are to be met with. The well known green turtle, *Chelone mydas*; the Loggerhead, *Thalassochelys caretta*; the Leathery turtle, *Dermatochelys coriacea*; and the Hawks-bill, *Chelone imbricata*. The habits of the green turtle are familiar, from books at least, to every one. It is still common enough along our sandier coasts, and I have often seen it putting up its head above water, especially in the early morning, off Lumut in the Dindings, and elsewhere. It is a vegetable feeder, eating seaweeds, and probably, as seaweed is very scarce in our waters, it also eats the Setul, a grass-like flowering plant, common in muddy spots round the coast. The logger-head is a large turtle which feeds on marine animals, and is recognized by the yellow markings on its head and flippers. It may often be seen just outside Singapore harbour, putting its head above water, and then diving again, remaining a long time under water. The huge leathery turtle, has only once appeared on our coasts, a large specimen now in the Museum having been caught at Tanjong Katong. It is also carnivorous, and like the last-mentioned turtle is uneatable. The Hawk's bill occurs in the neighbouring seas, and I have seen live ones brought into Singapore, but whence I could not discover. Some years ago, while up the Sepang river in Selangor, a good way above tidal waters, I saw a turtle slip off the bank into the river. It swam very fast down stream, pursued by the boatmen, and then turned and came past me quite close. Its paddles were moving very rapidly and it lay right over almost on its side, as if to reduce the amount of friction against the water as much as possible. It eventually got into a deep hole, whence we could not get it out. From what I could see of it, it appeared to be a Hawk's bill.

## CROCODILES.

*Crocodiles.* The common crocodile is *Crocodilus porosus*. Cantor mentions *C. palustris*, the Mugger of India, as occurring in Penang, but as being less common than the other kind. Lieut. Flower has seen a young specimen from Singapore in the British Museum and Mr. Butler has got one in Selangor. This crocodile is distinguished by its shorter and broader snout, and by having five teeth in its premaxilla, and not four only as the common kind has. It seems also on the whole to be a smaller animal.

The common crocodile varies in colour, being sometimes black and yellow, at others entirely black. The Malays consider the yellow variety as being the most dangerous. This species is strictly speaking a tidal river or marine animal. It seldom goes far up rivers beyond tidal waters, and it sometimes goes very far out to sea. I saw the skull of one at Cocos Island, which had turned up there some months before my visit, and which must have swam at least 200 miles in the sea ere reaching the islands. They sometimes leave the water and go for some distance inland, apparently trying to get across from one river to another. I saw one which had just been killed in a coffee estate near the caves at Kwala Lempur, where it had been found wandering about among the coffee, at no great distance from the river, however. Of the ferocity and cunning of this, our most dangerous wild beast, there is no need to write, it is too well known; but I will mention one incident concerning it. Some years ago, a Malay forest-guard was in a mangrove swamp at low tide, the water where he stood being only a foot deep, when a crocodile suddenly rose out of the mud on its hind legs and bit him on the elbow. The man tore his arm out of its mouth, and it rushed off. The Malays' theory on the subject was that the man was standing on or close to the animal's nest, but it seems curious that the crocodile should be buried in the mud in such a manner, and that it should spring at his arm and not bite him on the leg, which would be the nearest part to him. In captivity the crocodile is rather a stupid animal, but a young one kept in the Gardens has learnt to come out of the water for a piece of meat when whistled to.



Of the habits of the Gavial, *Tomistoma Schlegeli*, but little is known at present. It occurs in the Perak and Pabang rivers, where, above Kwala Tembeling, I have seen tracks on the sand banks probably of this species. Sportsmen far up the larger rivers should keep a look-out for this animal, as well as for the Mugger, for it may be much more widely distributed than at present appears.

#### LIZARDS.

Our largest land lizard is the Monitor, *Biawak* of the Malays, often erroneously called an Iguana here, *Varanus salvator*. This animal attains a length of seven feet, but its tail forms, a large proportion of that length. It always lives near water, either river or pond, or the sea, in which it quickly takes refuge when pursued. It dives very well, and remains a long time under the water. If it is unable to get into water, it will quickly climb a tree when alarmed. It gallops at a great pace when frightened, though very clumsily, and the noise it makes dashing through the bushes is out of all proportion to its size. When cornered, it defends itself by lashing out with its tail, and making a puffing noise like a spitting cat. It also bites very fiercely. It is carnivorous, feeding on birds, rats, fish and insects, often attacking poultry. When a rat is given to it, it seizes it in its mouth and shakes it like a dog, then after biting its body all the way down till all the bones are broken, swallows it whole. In captivity I have never heard it make any noise but the spitting sound, but Malays have told me that a loud barking ha-ha-ha which I have heard in swamps is the cry of the Biawak. The eggs are large and white, with a soft shell like that of a turtle, and are deposited in holes in sandy ground and covered up. I once found at Bruas, in the Dindings, a monitor laying its eggs in a shallow hole. The Malays, however, have a story to the effect that when the eggs of a crocodile hatch, all the young ones which go towards the water become crocodiles and those which run on the land become Monitors.

Besides the common Monitor, *V. salvator*, there are three other kinds to be met with here. *V. flavescens*, Penang and Jelebu; *V. nebulosus*, Penang and Malacca; and *V. rudicollis*, Malacca. These are all smaller than the common kind.

The pretty sand lizard, *Liolepis Bellii*, about a foot long, and beautifully ornamented with blue and red, is very common on the sandy plains of the Pahang river, and I have also seen it in Malacca, at Pengkalau Kumpas, and at Bruas, in the Dindings. It can be seen sitting in the sun in the heat of the day, sunning itself, but never far from its hole, into which it darts with surprising rapidity.

The Chamæleon Lizard, *Calotes cristatellus*, is very common in all gardens. Its ordinary colour is bright green, but when vexed it turns to a dusky brownish colour, whence its popular name. When alarmed it runs very fast on the ground, holding up its long whip-like tail, to the nearest tree or post, up which it climbs, and if this is not high enough to be safe, springs on to a higher one. If a human being happen to be in its way, it does not delay to run up to his shoulder or head and jump off from there. The distance it can jump from tree to tree is very considerable, having regard to the size of the animal. It generally lays two eggs at a time, but Lieut. Flower found females of another species, with as many as seven or eight eggs in them, the eggs are about an inch long, narrow cylindrical blunt at both ends, and enlarged rather abruptly in the middle. They are white and leathery. The lizard places them side by side on the ground in a damp spot and leaves them, not attempting to conceal them. If attacked by a dog the *Calotes* runs for a short distance, and then turns and rushes at its enemy with open mouth, springing at its nose and biting sharply, but is soon tired out and killed. In spite of its teeth and the spines that protect its head and neck, it frequently falls a victim to the attacks of sparrow-hawks and snakes, and the Monitor is also very fond of it. The Malays hold it somewhat in horror, as being one of the forms in which wizards send out their imps to annoy their enemies.

The flying lizard, *Draco volans*, is at times very common. It appears to move about in flights, for while perhaps for some months hardly any are to be seen, at other times one may see half a dozen in a morning. They appear usually in the hottest part of the day, sailing from tree to tree, always selecting trees with grey smooth bark of the same colouring as themselves. Furthermore they nearly always choose the same trees for their

route, so that when they appear in the Gardens one knows exactly which tree one will find them on. When they alight on a tree they run up, puffing out and contracting the conical pouch in the throat, which is bright yellow in the male and blue in the female, and licking up the ants, which form their chief food. When they have climbed sufficiently high, they spring off again spreading the wings (which are expansions of skin on the elongated ribs) after they are in the air, and closing them as they alight. Though they usually go in straight lines, they can swerve in their flight, apparently by lying slightly over on one side or the other. I have seen one avoid a bush which was in its line of flight in this way. The distance that they can cover depends on the height from the ground of the point from which they spring, for as in the case of all animals that fly in this manner (the flying squirrel and flying lemur), they descend in their flight; but the longest flight I have measured was twenty-five yards, from a height of not more than fifteen. These animals are able to change colour, as the *Calotes* does, the blue ornamental patch on the head disappearing, and the whole lizard becoming of a brown hue, except the pouch, which retains its colour.

*D. volans* is by far the commonest species here, but there are four or five other kinds to be met with, which generally occur in thick forests, and are very difficult to collect, as they very quickly fly out of reach, and can only be obtained with the gun.

The common Scinc, *Mabuia multifasciata*, a stout brown metallic lizard, ornamented with a glowing red patch along the side just below the head, is very abundant in the grass and along drains, creeping about when the sun is bright and hiding in holes and under roots when alarmed. When closely pursued by a dog, the Scinc will sometimes take to a tree, climbing up well out of reach, and when roughly handled it sheds its tail, as do the Geckos, the tail skipping about very actively for some minutes after it drops. It readily takes to water, diving in when frightened and remaining a long time below the surface. Besides this common Scinc, there are one other *Mabuia* and seven smaller scincs of the genus *Lygosoma* recorded from the peninsula, most of which are either very scarce or difficult to find or very

local. One, *L. jerdonianum*, seems to be absolutely confined to Pulau Tikus in Penang, having never been seen anywhere else. Every one in the tropics soon makes the acquaintance of the House Geckos, and the habits of these useful little insect killers are well known, and have often been described, but it does not seem to be generally known that at least eight species belonging to four genera inhabit our houses. In some houses the common one is *Gehyra mutilata*, a very pale colored and rather small kind, in others the large dark brown *Gecko Monarchus* takes its place, or drives it at all events out of the verandah, which is evidently considered the best feeding ground by the house geckos. In other houses again quite different ones appear. The Siamese Tokay, *Gecko verticillatus*, a large kind with an exceedingly powerful voice, has been recorded from the peninsula, and even from Singapore, but this latter locality must be very dubious. We have, however, another very loud voiced one (probably *G. stentor*) in the forests, where it lives in hollow trees, and utters a very loud call.

Besides these house geckos, there are a number of jungle geckos, which live in holes in trees or under bark, only appearing at dusk. A very odd little one, *Gonatodes kendalli*, lives in cracks and holes under large rocks in the Bukit Timah woods. It is dark brown, and has an unusually long tail, which it often carries over its back coiled up like a watch spring when it runs.

#### SNAKES.

The ordinary visitor to the tropics is filled with a nervous horror of snakes, always expecting to find most deadly kinds in the house or to be attacked by them if he sets foot outside. He conceives it his duty to slaughter all, even the most harmless and useful species, as soon as he sees them. Nor is his opinion altered by conversation with Malays, who assure him that even the most inoffensive of them are horribly deadly. Malays have pulled me back in horror when I was picking up a little *Typhlops*, a snake about the size of a moderate-sized earth worm, with a mouth too small even to nip a portion of one's skin, assuring me that it was a most venomous animal. The visitor, however, if of an observant turn of mind, discovers ere long that poisonous snakes are comparatively rare, and that cases of dangerous

snake-bite are exceedingly rare, and the risk of injury from snakes is so infinitesimal that it may be utterly neglected as one of the dangers of the tropics. Cases of death from snake-bite are from time to time recorded, but, usually at least, the snake is not identified, sometimes not even seen, and it is clear that there has been a good deal of guessing as to the cause of death. Good records of cases by persons who know the poisonous snakes by sight would be very useful. Death from snake-bite in India seems to be remarkably common, why should it be so rare here? The only really probable suggestion I have heard was made by a native who had lived in India, who pointed out that while in India the snakes mostly live on the ground, here they live high up in the trees, and there is a good deal in this; I have seen the green viper and hamadryad both brought down from the tops of trees forty feet high. Squirrels and tupaia, some of the rats, as also the birds on which these animals mostly live, reside high up and seldom come to the ground, and the snakes pursue them there, while the hamadryad pursues the other snakes. Another fact seems to be clear, which is that some snakes, notably the green viper, imagined to be very deadly, is indeed not nearly as dangerous as it is supposed to be, but of this more anon. It may, however, be pointed out that the most destructive of the Indian snakes are the cobra, the *Ticpolonga* or *Daboia* and the Krait. The two latter are absent from the peninsula, and the Cobra does not seem to be very dangerous here.

I should hardly have thought it worth while to allude to the serpent fascination myth, except that recently, at the British Association, a paper was read to disprove the popular error that snakes fascinate or mesmerise their prey before catching it. Anyone who has ever kept snakes knows that nothing of the kind ever happens, but like the theory of the imitative powers of apes and the fiction that the man-eating tiger is invariably an old animal which has lost its teeth, these popular errors seem to take an unaccountably long time to die. Snakes either quietly creep up to their prey, and seize it when asleep or resting, or wait in likely spots for the prey to come to them. Many, especially the larger snakes, are nocturnal or hunt only in the twilight, when their prey can hardly see them. The smaller insect-

eating snakes chiefly work by day. Most snakes are colored for concealment, and inhabit spots suited for their coloring. The green viper (*Lachesis Wagleri*) sits usually about 4 or 5 feet high in a bush, in a sunny spot, where its blue-black, green and yellow mottling is matched by the spots of light and shade on the bright green leaves. The python, again, with its light and dark brown carpet pattern, resting among dead leaves, or in the hollow of a tree, is equally inconspicuous; even poisonous snakes, which sometimes are very gay with warning colors, are by no means as conspicuous as they appear. The beautiful *Elaps bivirgatus*, with its scarlet head and tail and deep blue body, is wonderfully invisible in the shadows of the woods, but when in danger it exhibits its brilliant coloring as plainly as it can, in order to warn the enemy that it is venomous, and can give a fatal bite if it chooses. *Callophis* is another genus of poisonous snakes that is brightly colored. In danger, however, it does not trust to its warning colors only, but beats its tail quickly on the dead leaves, making a rattling sound. A terrier which came upon one of these small snakes, and was about to kill it, stopped at once when the snake began to rattle its tail, and went away, evidently understanding the signal. *Bungarus* again, a large and dangerous black and yellow snake, makes the same kind of rattling. A poisonous snake will not as a rule waste its poison on an animal it cannot swallow, and naturally prefers to drive its enemy off by frightening it, if it can.

Snakes, like many of our wild animals here, know very well the conspicuity of motion, and when crossing an open space such as a road, where they are visible from some distance, usually remain perfectly motionless if an enemy comes in sight and they have no time to get into shelter. This is why they are more often seen on roads by persons driving or walking than elsewhere. Being alarmed when crossing from wood to wood, they remain motionless for some time, in the hope that they may be taken for a root or piece of stick. I have seen a terrier, who invariably pursues snakes when she sees them, jump over one lying on the path, mistaking it for a stick. Had it moved, she would have immediately killed it.

There are no less than one hundred and ten kinds of snakes recorded as occurring in the peninsula, and more than half of

these have been found in Singapore. A number have only been collected once or twice, and some of the records may be considered doubtful, but as only a small part of the peninsula has been yet collected in, we may expect large additions as time goes on.

One of the commonest is the Python (*P. reticulatus*), the Ular Sawah of the Malays. It is perhaps the largest snake in the world, a specimen measuring 40 feet having been reported as obtained by a scientific expedition in Manila. Pythons of 20 feet in length are by no means uncommon here, and specimens of 26 feet are occasionally met with, but accurate measurements of larger ones are still required. The python is nocturnal in its habits, remaining concealed under bushes or fallen logs during the day, and wandering about at night in search of food. It eats squirrels and rats and birds, and often makes its way into a hen-house, where it not only eats half a dozen or more chickens in a night, but usually kills more than it eats. The larger ones will also eat dogs and cats, goats and pigs. A snake a little over seventeen feet long ate two black swans on the garden lake at the rate of one a month, and I have had a python of about 15 or 16 feet long brought me, which had just swallowed twelve ducks. On one occasion five pythons were put together into a large cage. The biggest was a little over nineteen feet long, another was between 17 and 18 feet, and the other three were from 12 to 15 feet in length. The biggest snake ate all the three smaller ones in two nights, and attacked the remaining one, which however succeeded in beating it off, not without being wounded. But although they are sometimes very voracious, they will often go without food for a very long period. A large one, twenty feet long, was fed on a good sized pariah dog, after which it refused food for nine months, when it passed the remains of the dog, and began to feed again. Another remained for seven months without food, in the same manner. Smaller snakes feed oftener, usually once a month, and sometimes even oftener than that. A hungry python strikes its prey with lightning-like rapidity, usually seizing it by the head, if it is small enough, in which case the animal or bird is killed by the crushing of the head. It then, turning its head down, encloses the prey in a coil and a half and proceeds to swallow it slowly. In the case of fairly large animals, and those that are not killed by

crushing the head, the prey is crushed by the coils. In the case of a swan swallowed by a fair sized python, the head was crushed, evidently by the first bite, but the bones of the body were not broken at all, although the bird was very much thicker than the python. In some books it is stated that the prey is smothered in the coils, but as a matter of fact, the bite of the python is severe enough to cause instant death in most of the smaller victims, and the contraction of the coils crushes the larger ones. The main use of the coils in the case of small animals and birds is apparently partly to hinder their struggling, and partly to push the carcase into the proper position for swallowing, and to assist the deglutition by pressing the food against the other coils and the ground. It is only when the prey has almost disappeared down its throat that the snake straightens itself out. The Chinese eat the flesh of the Python, and the fat, of which there is usually a good deal, is a popular native medicine. In colour the python varies somewhat, young and half-grown specimens being often almost golden yellow. I have also seen a very dark, almost black variety.

*P. molurus*, the Indian python, is recorded from the peninsula, but I have not seen it.

*P. curtus*, the little red python, formerly considered very rare, does not seem to be so in the peninsula. It is quite small for a python, only 8 or 9 feet long usually. It is a quiet snake in captivity and seems chiefly to feed on rats.

The little burrowing snakes, *Typhlops*, are to be found in rotten cocoanut palms, and other trees, in the sawdust of the saw mills, and in the ground. A great number of kinds have been described, but they are very difficult to identify. Our commonest species is *Typhlops braminus*. It is usually about four inches long, and very slender, with a very small head, and minute eyes, and a sharp-pointed tail. Its colour is lavender grey, or black, and it is very active, wriggling like a worm when disturbed.

*Cylindrophis rufus* is another burrowing snake, but is much larger, about a foot long. It is black, with white bands beneath, some red on its neck, and a bright red tip to its tail. It is short and thick, and has an odd habit of flattening itself out, and turning up the tip of its tail. It is common in gardens, burrowing in the ground.



*Chersydrus granulatus* Schn. is a short thick blunt-nosed snake, alternately banded with dirty brown and white. It seems to be rare here, only two specimens being recorded from the peninsula, in Flower's list. One was recently brought to me which had been found in the road near the gardens. As it is an aquatic snake which lives on fish, it is probable that it was attempting to cross from some ditch which had dried up from the very hot weather, in order to find another wet spot.

There are many very pretty harmless tree-snakes, slender long-tailed reptiles, often gaily coloured. They usually creep about in bushes at no great height from the ground, moving very briskly when disturbed. Such are the snakes of the genera *Dendrophis*, *Dendrelaphis* and *Dryophis*.

*Dendrelaphis caudolineatus* is a very common kind, brown with a bright yellow band down its side. It seems more or less gregarious, as I have seen three in one bush. When annoyed I have noticed it emits an appalling odour of carrion.

The little snakes of the genera *Ablabes* and *Simotes*, though allied to *Dendrelaphis*, are generally to be met with creeping on the ground, or concealed beneath logs or stones. They never seem to climb into trees, and being terrestrial are usually dull brown, sometimes marked with red. *Simotes purpurascens*, which I got from the Bukit Timah road, was dark brown with large distant red spots and a bright red belly. *S. signatus* I found under a pile of tiles in the garden. It was also dull brown. *S. octolineatus*, which is perhaps the commonest kind, is a bigger and gayer-coloured animal, brown or yellow with eight black lines running its whole length, a red bar down its back and a red belly.

A very interesting and common snake is *Macropisthodon rhodomelas*, a slender terracotta red snake, usually about a foot long, with a curious bluish triangle on its neck in a black V, and a black line down its back. It is often to be seen gliding through the grass or across paths in the day time. Its peculiarity is its means of defence. When vexed, it sits up after the manner of a cobra, and seems to flatten out its neck as if it was trying to imitate that species, while from the bluish patch on its neck are exuded some drops of a white viscid liquid representing the well-known cobra marks. I noticed that my dog, seizing this

snake in its mouth to worry it, presently foamed at the mouth, as if he had been licking a toad, and soon dropped the snake. I tasted the exudation, and found it bitter, but it had no effect on my salivary glands. It is evident, however, that it must act as a deterrent on its enemies, and perhaps the cobra-like habit of sitting up may also alarm an animal about to attack it, but I must admit the actual resemblance to a cobra is not really very great. This snake possesses two very long glassy fangs at the back of its mouth, which might lead persons to suppose that it is venomous, but the poison fangs of a dangerous snake are in the front of the mouth, and *Macropisthodon*, though it can bite sharply, is not poisonous.

There are a good many snakes of the type usually popularly known as Rat-snakes, and Water-snakes, several of which attain a considerable size, seven or eight feet long. The black ones such as *Coluber melanurus*, which I have found under a pile of rotten boards, are often mistaken for cobras and promptly slain, whereas as rat-killers they might be encouraged. *C. taeniurus*, the cave snake, which I described in the last number of the Journal, has been recently caught by Mr. Rostados at Kota Tinggi, in Johore, far away from any caves or rocks, and this specimen is certainly more of the olivaceous colour described by Boulenger, and not so white as that of the caves.

*Dipsadomorphus dendrophilus* is a common and very beautiful harmless snake of considerable size. It usually lives in mangrove swamps, where it sits coiled up on the branches waiting for birds or rats. Its colouring is an intense glossy black with bright yellow bands, and in this it resembles the deadly *Bungarus fasciatus*, also a mangrove-haunting snake, but whether this can be classed as a genuine case of mimicry or is only an accidental resemblance it would be hard to say. It is a very quiet snake, and becomes quite tame very shortly after capture. One captured on the Sirangoon river, where it is very abundant, laid four rather large oblong white eggs, soon after it was caught. The Malays call it Ular ranke or Ular chin-chin mas.

*D. cynodon* is another common species, about five feet in length. There are two colour forms of this, which look so different that one would hardly recognize them as the same. In one the body is bright brown with darker blotches and a yellow

throat. I caught a fine one on Gunong Keledang in Perak, among thick fern. The other form is almost black with a few yellow marks, about its head. One was brought me by a small Malay boy from Tanglin village, where he declared it had been killing the fowls.

*Zaocys carinata* is a large harmless snake, of which I caught a very fine specimen, about eight feet long, after a considerable chase. It was almost completely black, but there are also light-coloured varieties. It moves very rapidly, and I could hardly keep up with it though I was running on the path and it was gliding through the scrub. The Malays called it Ular Tedong, but this name is applied apparently to a variety of snakes.

The green tree-snake, *Dryophis prasinus*, the Ular Daun of the Malays, is another of our very common snakes. Usually of a bright apple-green, with its long slender whip, like body and its pointed snout, it is easily recognised. It is readily tamed, though when fresh caught it is apt to be snappish. There are two or three colour varieties, the commonest of which next to the green one is light brown, but I have also seen a form banded alternately grey and white. It feeds chiefly I believe on frogs and lizards. I found one on an occasion trying to swallow a *Calotes* in spite of the thorny spikes on its back. The Malays say that if you take the fat of this snake and make a lamp with it and a floating wick, on lighting this in the evening, the whole room or house becomes full of these green snakes, and this diversion is sometimes employed on festal occasions. My informant told me that he had seen this done with perfect success.

No less than thirty-one poisonous snakes are recorded from the Peninsula, but nearly half of these are sea snakes. Very little is known as to the habits of these latter. They are generally taken out of the fishing stakes, where they doubtless go in pursuit of the fish, on which they live.

*Bungarus fuscatus* has already been alluded to. It is a fairly large powerful snake, of a black colour with yellow bands. It is almost always found near the sea, in tidal waters. In captivity it is vicious and ill-tempered, striking about freely and furiously rattling its tail.

The Cobra is well-known to residents, being quite a common garden snake. The specimens met with in the south of the

peninsula are nearly always inky black, further north they are brown. I have never seen a brown one in Singapore, nor a black one in Penang or Province Wellesley. They appear to be much smaller than the Indian form, a specimen over five feet long being unusual. When annoyed the Cobra sits up in the well-known manner, and makes a very curious snorting noise, holding its mouth open in the form of a circle, and every now and then spitting its saliva at its opponent, whence its name *Naja sputatrix*. It never attempts to bite, but spits with great accuracy. One struck me all over the face at a distance of eight feet, and a student of snakes, who was not aware of this habit in our local variety, was struck in the eye by one he was examining; the saliva, which produces only a slight irritation of the skin of the face, causing some amount of inflammation in the eye, which did not subside for some hours. I have also seen a dog struck in the eye by the saliva, while attacking a cobra, much to his discomfiture. When cornered and defending himself, the cobra is very quick in turning the raised part of the body, which it throws forward for a considerable distance, to deter its enemy, but if left alone, glides away as quickly as it can, taking refuge under a log, or in a hole. It is nocturnal in its habits, remaining in its hole all day, unless disturbed. It generally feeds on mice and toads, but I once found one eating a small snake (*Macropisthodon*). In captivity it is quiet, and usually gentle.

The Hamadryad (*Naja bungarus* or *Ophiophagus claps*), though not an exceedingly common snake, is probably better known by reputation to residents than any other. It is the biggest of all our poisonous snakes, attaining a length of 13 feet, and is proportionately stout. In colour it is usually a pale brown, without any markings, and as it does not sit up so often as the cobra does, when in danger, and the large poison glands, so conspicuous in many venomous snakes, are not very clearly visible, it is often mistaken for a harmless snake. Its plain brown colour, the large plates on its blunt head, and when irritated, its erect attitude and expanded hood easily distinguish it. It is commonly reported to be very aggressive and to pursue people who irritate it. I have never seen this myself, and it certainly requires further proof. As is well known, it feeds, generally at least, on other snakes, and I have caught one in the act of swallowing a small

python. Although the Indian Hamadryad is easily kept in confinement in England, I have never been able to keep one very long here. It refuses all food, not only its natural food of snakes, but also eggs and milk, which almost every other snake will lick up. The Hamadryad is less common in Singapore now than formerly, I believe, but is occasionally taken. Four or five have been taken in the gardens within the past six or seven years, one about eight feet in length having been caught here last September, but it is fairly abundant in other parts of the peninsula.

The beautiful scarlet and blue *Doliophis bivariegatus* is not common in Singapore. I have only once seen it here, but it is plentiful in the hill woods, where it may be seen basking in the sun on the paths. It occurs in Penang, Malacca, Province Wellesley, Selangor, the Dindings and Kedah, as well as Singapore.

Of the Vipers, by far the commonest is *Lachesis Wugleri*, a vicious looking, but handsome snake, mottled with green, dark blue, yellow and black. Its large flat head, shaped like the ace of spades, and narrow yellow eyes, give it a wicked appearance. It is generally about two feet and a half in length when full grown, and is thick in proportion to its length. It is an arboreal snake, sitting very quietly upon the boughs of trees or bushes, where it catches rats and birds. Young specimens are often plain dull green with a few distant reddish spots, and do not at all resemble the common form. I have seen a female viper opened which contained several young ones, of which all but one were coloured like the adult, while the remaining one was of the plain green form. It occurs all over the peninsula. When annoyed it opens its mouth exceedingly wide, showing its poison fangs, but it is very slow and stupid, creeping away in a leisurely manner. It has a great reputation as a very deadly snake, which I have reason to believe is hardly justified. I have seen one strike a java sparrow on the thigh, producing a considerable flow of blood. The sparrow flew to the end of the cage but showed no signs of poisoning, and remained quite lively till the snake pursued it again and caught it by the head and killed it. A cooly stepped on a young green viper about a foot long, which bit him on the toe. I was not informed of this for over an hour, when I went to see him and found his leg a good deal swollen and he was suffering a good deal of pain, but after rubbing his leg and

treating the bite with permanganate of potash, he very soon got better and was well in a couple of hours. In fact the bite was no worse than that of a centipede. A good sized pariah dog was bitten on the thigh by a full grown and large sized green viper. The wound bled a good deal, and the dog uttered a cry and ran off, but in an hour or two it reappeared none the worse. I have also seen two cases in which coolies stated they had been bitten by green vipers, and in one certainly saw the snake (also a young one), which was said to have bitten the man, but in neither case were there any of the serious symptoms of snake bite; and as the green viper when it bites holds on tight for some time, and does not merely strike without closing his mouth as the cobra does, it must inject a good quantity of the saliva into the wound; wherefore I conclude the animal is not as deadly as it is reputed to be. Fayrer in "*Thanatophidia*" in writing of *L. gramineus* quotes from Russell and Blyth, both of whom had seen cases of men bitten by green vipers who merely suffered from pain and swelling and recovered, and Russell, experimenting with the poison of this species, found that it killed birds, but that pigs and dogs recovered, so that it may be doubted that any of these vipers are truly deadly. *L. Wagleri* lives very well in captivity, and is quite gentle and very sluggish. Young animals live chiefly on geckos, the bigger ones eat rats and birds, and it is surprising what large rats they will eat. I have given one a large dead rat with its arms stretched stiffly out and quite rigid, but the viper managed to swallow it quite easily getting the sides of its mouth round the projecting arms most skilfully.

The other green coloured viper (*Lachesis gramineus*) of a plain green colour with a reddish tip to its tail, was apparently much more common in Singapore formerly than it is now, for while looking over the collection of serpents in the British Museum I noticed that there were many specimens of this snake, all from early collectors, and very few *L. Wagleri*. Now, however, *L. gramineus* is quite rare. I have only met with one or two, while *L. Wagleri* is, as I have said, very common.

The purple viper *L. purpureo-maculatus*, not a very plentiful snake, seems always to reside on the sea-shore, hiding under rocks or basking in the sun. It is of a very deep purple brown colour, nearly black. I have caught it on the shore at Toas, and

seen it from Blakang Mati.

Two other vipers, *L. sumatranus* and *L. monticola*, are also reported from Singapore and Penang, but they appear to be very rare here.

There can be no doubt that snakes are much scarcer in Singapore than formerly, and this is no doubt due to clearing of much of the jungle, and especially the constant burning of the Lalang, but still a great variety remain here, and some kinds are still remarkably abundant, and those by no means always of the smaller kinds.

It is rather interesting to observe the behaviour of various animals at the sight of snakes. Common monkeys are usually very excited, crowding together to look at it, and chattering loudly. The Mias, who usually inhabits trees taller than snakes are accustomed to ascend, seems to take no notice of one. The binturong, on bringing a cobra near it, turned its face away as if in horror, but really no doubt recognizing that its most vulnerable portion was its face. The Water Mongoose, *Herpestes brachyurus*, like the Indian Mongoose, bristles up its fur and attacks and devours the snake. Some deer, when a large python was brought past their paddock, though at some distance, crowded together at the bars, gazing at it and stamping their feet, evidently recognizing it as a dangerous enemy.

I append a list of our reptiles as far as at present known, based on Mr. Flower's list already referred to, with the addition of later captures and have added all recorded localities. Those marked (!) I have collected myself or have seen in the Singapore Museum. It will be seen how little we know of the fauna of the Native States as yet.

## List of Reptiles.

### CHELONIA.

- Dermochelys coriacea* Boul. Singapore !  
*Callagur picta* Gray. Penang, Singapore !  
*Batagur baska* Gray. Penang.  
*Kachuga lineata* Gray. Leggeh !  
*Bellia crassicolis* Gray. Penang !  
*Cyclemys platynota* Gray. Singapore !  
*C. amboinensis* Daud. Singapore ! Malacca !  
*Geomyda spinosa* Gray. Singapore ! Penang, Dindings ! Leggeh !  
*G. grandis* Singapore ! Selangor !  
*Testudo emys* Schl. Penang, Dindings ! Perak.  
*Chelone mydas* L. Dindings ! Kedah !  
*Ch. imbricata* L. Singapore ?  
*Thalassochelys caretta* L. Singapore ! Johore !  
*Trionyx subplanus* Geoff. Singapore, Penang.  
*Tr. hurum* Gray. Penang, Leggeh !  
*Tr. Phayrei* Theob. Penang.  
*Tr. cartilagineus* Bodd. Singapore ! Penang.  
*Pelochelys cantoris* Gray. Penang.

### CROCODYLIDAE.

- Tomistoma schlegeli* S. Müll. Perak, Pahang.  
*Crocodylus porosus* Schn. Singapore ! Johore, Penang, Province  
 Wellesley ! Perak ! Selangor ! Kedah, Dindings !  
*C. porosus* Less. Singapore ? Selangor.

### LACERTILIDAE.

- Gonatodes affinis* Stol. Penang.  
*G. p. ...* Gray. Penang ! Perak !  
*Gonatodes Kendallii* Gray. Singapore ! Perak.  
*G. affinis* Stol. Penang.



- Aeluroscalabotes felinus* Gthr. Singapore.  
*Hemidactylus frenatus* D. & B. Singapore, Penang ! Perak !  
*H. Gleadovii* Murr. Singapore.  
*H. depressus* Gray. Singapore.  
*H. Leschenaultii* D. & B. Penang.  
*H. Coctæi* D. & B. Penang.  
*H. platyurus* Schn. Penang, Singapore !  
*Mimetozone Floweri* Blgr. Penang.  
*Gehyra mutilata* Wieg. Singapore ! Penang ! Perak !  
*Lépidodactylus ceylonensis* Blgr. Singapore.  
*L. lugubris* D. & B. Penang.  
*Gecko verticillatus* Lawr. Singapore, Penang.  
*G. stentor* Cantor Penang  
*G. Monarchus* D. & B. Singapore ! Penang, Malacca !  
*Ptychozoon homalocephalum* Grey. Penang, Singapore !  
*P. horsfieldi* Gray Singapore, Penang.  
*Draco volans* L. Singapore ! Penang, Malacca, Dindings ! Kedah !  
*D. maculatus* Gray Penang.  
*D. fimbriatus* Kuhl. Singapore, Penang.  
*D. quinquefasciatus* Gray. Penang, Selangor !  
*D. melanopogon* Blgr. Malacca, Singapore !  
*Aphaniotis fusca* Ptrs. Malacca.  
*Gonyocephalus Herveyi* Blgr. Malacca.  
*G. borneensis* Schl. Malacca, Perak !  
*G. grandis* Gray. Penang.  
*Acanthosaura armata* Gray. Singapore, Penang.  
*Calotes cristatellus* Kuhl. Singapore, Penang, Selangor, Kemaman !  
*C. versicolor* Daud. Singapore, Penang, Kedah, Province Wellesley !  
*Liolepis bellii* Gray. Malacca ! Pahang ! Dindings ! Penang, Province Wellesley.  
*Varanus flavescens* Gray. Penang.  
*V. nebulosus* Gray. Penang, Malacca, Singapore !  
*V. rudicollis* Gray. Malacca.  
*V. salvator* Laur. Singapore ! Penang, Kedah, Pahang ! Dindings ! Malacca !  
*Mabuia novemcarinata* And. Penang.  
*M. multifasciata* Kuhl. Singapore ! Penang.  
*Lygosoma anomalopus* Blgr. Penang.

- Lygosoma olivaceum* Gray Singapore! Penang.  
*L. singaporense* Singapore.  
*L. jerdonianum* Stol. Penang.  
*L. Bourringii* Gthr. Singapore.  
*L. albopunctatum* Gray. Singapore, Penang.  
*L. chalcides* L. Singapore, Penang.

## OPHIDIA.

- Typhlops lineatus* Boie. Singapore, Penang, Malacca.  
*T. braminus* Daud. Singapore! Penang.  
*T. bothriorhynchus* Gunther. Penang.  
*T. nigro-albus* D. & B. Singapore, Perak, Penang.  
*Python reticulatus* Schn. Singapore! Penang, Perak! Selangor!  
*P. molurus* L. Province Wellesley?  
*P. curtus* Schl. Singapore! Malacca, Selangor?  
*Cylindrophis rufus* Lawr. Singapore! Penang.  
*C. lineatus* Blauf. Singapore!  
*Xenopeltis unicolor* Reinh Singapore! Penang!  
*Acrochordus javanicus* Hornst. Singapore, Penang, Pahang.  
*Chersydrus granulatus* Schn. Singapore! Penang.  
*Xenodermus javanicus* Reinh. Penang?  
*Polyodontophis geminatus* Boie. Singapore, Malacca.  
*P. sagittarius* Cant. ?  
*Xenochropis cerasogaster* Cant. Province Wellesley.  
*Tropidonotus trianguligerus* Boie. Singapore! Penang.  
*T. piscator* Schn. Singapore, Penang!  
*T. stolatus* L. Singapore.  
*T. vittatus* L. Penang.  
*T. chrysargus* Perak!  
*T. subminiatus* Schl. Penang, Perak.  
*T. maculatus* Edel. Malacca.  
*Macropisthodon flaviceps* D. & B. Perak.  
*M. rhodomelas* Boie. Singapore! Pahang!  
*Helicops schistosus* Daud. ?  
*Lycodon aulicus* L. Singapore! Penang.  
*L. effrenis* Cant. Penang.  
*L. subcinctus* Boie Singapore! Penang, Kemaman!  
*Dryocalamus subannulatus* D. Singapore! Province Wellesley.  
*Zaocys carinatus* Gthr. Singapore! Perak.

- Zamenis korros* Schl. Singapore, Penang, Perak.  
*Z. mucosus* L. Singapore.  
*Z. fasciolatus* Shaw. Province Wellesley.  
*Xenelaphis hexagonotus* Cant. Singapore! Penang, Pahang!  
*Coluber porphyraceus* Cant. Singapore.  
*C. oxycephalus* Boie. Singapore, Penang, Pahang!  
*C. taniurus* Johore! Selangor!  
*C. melanurus* Schl. Singapore! Province Wellesley, Penang.  
*C. radiatus* Schl. Singapore! Penang.  
*C. Hodgsoni* Singapore!  
*Gonyophis margaritatus* Ptrs. Singapore.  
*Dendrophis pictus* Boie. Singapore, Perak, Kedah, Selangor!  
*D. formosus* Boie. Singapore! Province Wellesley, Selangor!  
*Dendrelaphis caudolineatus* Gray. Singapore! Pahang! Penang  
 Perak.  
*Macrocalamus lateralis* Perak.  
*Simotes purpurascens* Schl. Singapore! Johore, Penang.  
*S. cyclurus* Cant. Penang, Singapore!  
*S. octolineatus* Schn. Singapore! Perak.  
*S. signatus* Gthr. Singapore!  
*S. cruentatus* Gthr. Penang.  
*Ablabes tricolor* Schl. Singapore!  
*A. baliodeirus* Boie. Penang, Province Wellesley, Perak, Bujong  
 Malacca!  
*A. longicauda* Ptrs. Penang.  
*Pseudorhabdium longiceps* Cantor. Singapore, Penang, Perak.  
*Calamaria albiventer* Gray Penang.  
*C. sumatrana* Edel. Singapore.  
*C. leucocephala* D. & B. Singapore, Penang!  
*C. pavimentata* D. & B. Penang! Province Wellesley.  
*Hypsirhina plumbea* Boie. Penang.  
*H. enhydria* Schn. Singapore, Penang.  
*H. Sieboldii* Schl. Province Wellesley.  
*Homalopsis buccata* L. Singapore! Malacca, Penang.  
*Cerberus rhynchops* Schn. Singapore! Penang, Selangor!  
*Fordonia leucobalia* Schl. Singapore! Penang.  
*Cantorina violacea* Gir. Singapore!  
*Hipistes hydrinus* Cant. Singapore, Penang, Kedah.  
*Dipsadomorphus multimaculatus* Boie. Penang.

- D. Gokool* Gray. Penang.  
*D. dendrophilus* Boie. Singapore, Penang, Kedah, Din lings, Perak !  
*D. jaspideus* D. and B. Penang.  
*D. Drapiezii* Boie. Singapore ! Malacca.  
*D. cynodon* Boie. Singapore ! Province Welles'ey, Malacca, Perak ! (Gunong Keledang).  
*Psammodynastes pulverulentus* Boie. Penang, Perak.  
*Eryophis xanthozona* Boie. Penang.  
*D. prasinus* Boie. Singapore ! Penang, Pahang !  
*D. rubescens* Gray. Penang.  
*Chrysopetea ornata* Shaw. Singapore ! Penang ! Kedah, Jelebu !  
*D. chrysochlora* Reinw. Singapore ! Penang.  
*Hydrus platurus* L. Singapore ! Province Wellesley.  
*Hydrophis cærulescens* Shaw Penang.  
*H. Cantoris* Gthr. Penang.  
*H. fasciatus* Schn. Penang.  
*H. torquatus* Gthr. ?  
*Distira Stokesii* Gray Singapore !  
*D. Brugmansii* Boie. Penang.  
*D. sumatrana* Paud. Singapore.  
*D. J. Gray* Penang.  
*Enhydris Hardwickii* Gray Singapore.  
*Enhydrina Valakadien.* Boie. Penang.  
*Aipysurus Eydouxii* Gray. Singapore.  
*Platurus colubrinus* Schn. Singapore ! Penang.  
*Bungarus fasciatus* Schn. Singapore ! Penang, Province Wellesley, Pahang ! Malacca !  
*B. candidus* L. Kedah, Penang.  
*B. flaviceps* Reinh. Penang, Province Wellesley.  
*Naja tripudians* Merr. Singapore ! Penang, Province Wellesley ; Kedah.  
*N. bungarus* Schl. Singapore ! Penang, Province Wellesley, Pahang ! Selangor ! Perak.  
*Callophis gracilis* Gray. Singapore, Penang.  
*C. maculiceps* Gthr. Province Wellesley.  
*Doliophis bivirgatus* Boie. Singapore ! Malacca, Dindings ! Penang, Selangor ! Province Wellesley, Kedah.  
*D. intestinalis* Laur. Singapore, Penang, Malacca, Province Wellesley, Pahang !

*Haplopeltura Boa* Boie. Penang.

*Amblycephalus levis* Boie. Malacca ?

*A. malaccanus* Ptrs. Malacca.

*Lachesis monticola* Gthr. Singapore, Penang.

*L. purpureomaculatus* Gray. Singapore ! Penang.

*L. gramineus* Shaw. Singapore ! Penang.

*L. sumatranus* Raffles. Singapore.

*L. Wagleri* Boie. Singapore ! Penang, Malacca, Perak ! Selangor ! Pahang !

## Notes.

### The name "Malayu."

The national name of the Malays is mentioned, if not for the first time in recorded history, at any rate with a distinct territorial denotation, as early as the 7th century of our era by I Tsing, a Chinese Buddhist pilgrim, in two of his works, the *Ta-t'ang-si-yu-Ku-fa-Kao-sêng-ch'uan* or "Memoirs of Eminent Priests who visited India and Neighbouring Countries to search for the Law under the Great T'ang Dynasty," and the "Record of the Buddhist Religion as practised in India and the Malay Archipelago."

This latter work, the original title of which is *Nan-hai-chi-Kuei-nai-fa-ch'uan*, literally "The Record of the Sacred Law, sent home from the Southern Sea," has been translated, together with part of the former, into English, by J. Takakusu, a Japanese scholar, and was published in 1896 by the Oxford Clarendon Press. The author, who visited the Malay Archipelago in the winter of A. D. 671-2 and remained for some time in Sumatra, speaks of the *Mo-lo-yu* country as being one of the islands of the South Sea in which Buddhism then prevailed. He fixes its position by telling us that it lay to the west of *Shih-li-fo-shih* (Sri Bhoja or Bhoja), which place appears to be certainly identified with the *San-bo-tsai* of other Chinese chroniclers and the *Sarbaza* of the Arabian geographers of the 9th century. I Tsing tells us that Sri Bhoja had, in his time or shortly before his visit, annexed the *Mo-lo-yu* country.

Sri Bhoja was at this time a great centre of Buddhism, and I Tsing's object in visiting it was to study the sacred Canon and the Sanskrit language. After a stay of six months, he went on to the *Mo-lo-yu* country and then to India, but about A. D. 688 he returned to Sri Bhoja, and remained there about six years, so that he had ample opportunity for becoming acquainted with the circumstances of the country. From other sources\* this

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\* See especially Groeneveldt's "Notes on the Malay Archipelago," etc., Essays on Indo-China, etc. 2nd series, vol. 1.

place Sri Bhoja, *San-bo-tsai*, *Sarbaza*, etc., as it is variously called, has been identified with almost absolute certainty as being situated on the Palembang river in South-eastern Sumatra; and the *Mo-lo-yu* country can therefore be confidently regarded as placed immediately to the west or north-west, that is to say about the middle of Sumatra. I Tsing, who stayed in the *Mo-lo-yu* country for two months on his way to India, says that it was fifteen days' sail from Bhoja, the capital of Sri Bhoja; and it must have been situated approximately under the Equator, for in the middle of the eighth month and in the middle of spring the sun cast no shadow there at noon. Moreover it was half-way on the route between Bhoja and *Ka-cha* (a place in or near Achin or Kedah, more probably the former, as it was south of the country of the Naked People, *i e.*, the Nicobar and Andaman islands). From *Ka-cha* ships sailed in thirty days to *Nagapatana* (Negapatam), and I Tsing himself took ship there for *Tamralipti* (Tamluk), a port near the mouth of the Hooghly.

It seems therefore that the *Mo-lo-yu* country was not at this time a purely inland State, but had a coast line on the Straits more or less opposite to where Malacca now stands.

The language of the *Mo-lo-yu* country was that which served as a *lingua franca* in the Archipelago generally, and was known to I Tsing and other Chinese authors as the K'un-lun language. This term was derived, apparently, from the Chinese name of Pulau Condor, on the same principle on which slaves from these regions are often mentioned in Chinese chronicles as *K'un-lun* slaves, from whatever part of the Archipelago they might have actually been imported. The reason seems to have been that the Pulau Condor people were the first of the Southern islanders to come into contact with the Chinese, who afterwards loosely extended the term to the inhabitants of the Archipelago generally. This appears to be the meaning of the explanation I Tsing gives when, speaking of the Archipelago as a whole and after enumerating some of the principal islands, he goes on to say, "They were generally known by the general name of 'Country of K'un-lun' since (the people of) K'un-lun first visited Kochin and Kwangtung."

That the language was really Malay appears from the fact that the "*pin-lang* fruit" is mentioned by I Tsing as being used

in the Sri Bhoja country and other islands of the Archipelago for chewing with nutmegs, cloves and Barus camphor, for the purpose of rendering the mouth fragrant. *Pin-lang* is of course the Malay word *pinang*, areca nut.

In I Tsing's time, it seems therefore that the Malay country *par excellence* was in Central Sumatra, a fact agreeing very well with native Malay tradition on the subject, which derives the origin of many of the Malays of the Peninsula from the old Central Sumatran State of Menangkabau.

The etymological signification of the national name *Malayu* has been a subject of much dispute. I Tsing does not throw any additional light upon it; but he makes it quite clear that the word had in his time a local significance, and denoted the particular region from which a large part of the Malays of the modern *Tanah Malayu* love to trace their origin.

C. O. Blagden.

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### The Putri Gunong Ledang.

(FAIRY PRINCESS OF MT. OPHIR.)

The following extract from an essay written by a Malacca Chinese boy may be of interest to readers of the Journal of the Straits Branch of the Royal Asiatic Society. I give the boy's own words.

The aborigines of Malacca used to believe that Mt. Ophir was a sacred mountain. Mt. Ophir is also believed to be so by the Malays, as well as by most of the Strait-born Chinese. Since many years ago, neither Malays nor Chinese have ever reached the top of the mountain, where, as our ancestors say, there is plenty of gold strewn along the floor. Although some of the Europeans have been there, yet the natives have not believed it. It is said that there is a fairy who takes charge of the sacred mountain. In the morning, as the sun rises, the fairy is a beautiful girl playing near her well-built hut. At noon, as the sun is right over our head, the girl changes into a maiden; and in the evening, as the sun sets, the maiden becomes an old woman. The same thing happens every day.



There is also a sacred tiger possessed by the fairy as her sole guardian of the mountain. It always sits half-way down the mountain. As most of the uneducated are superstitious, they believe that there is also a kind of plant grown near the house of the fairy, and any one who gets a leaf from that plant and eats it, besides being always young and beautiful, will never die. Many of the ancient people of Malacca attempted to get some of the leaves, and many lost their lives in the attempts because of their absurdity.

This story was first told by a Malay who accidentally reached the top of the mountain. One day while cutting wood with some of his companions he was accidentally separated from them and was left alone in the forests. What was his alarm when he saw a tiger; and being unable to get rid of the wild beast, he fell on the ground and fainted. He was carried to the fairy, and being a worshipper, as people were in those days, he was well treated. He stayed there for several hours, and was told to pick some of the largest lumps of saffron and take them home. While he was walking the bag became heavier, and he then threw some of the lumps away. When he reached home he found that the saffron turned into gold. This is the story which the Malays as well as the Straits Chinese believe about Mt. Ophir or Gunong Leydang."

R. J. Wilkinson.

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### Golden Flowers.

There was living in Singapore not many years ago a Chinaman in very poor circumstances, who possessed, however, a small garden, in which grew a plant of the Pandan Wangi (*Pandanus laevis*), a tree which is often cultivated for its scented leaves used for flavouring rice and for making a kind of *pot pourri* used at weddings. He supplied the tree liberally with manure, and one moonlight night he was surprised to see it bearing a red flower. Going to examine it next day, no flower was to be seen, but next night it was there again, and he climbed up and got it, and put it on a table in his house. On the

following morning he found it was changed into gold, and broke off a bit and took it off to sell. On returning, he found the bit he had broken off had grown again, and this continued till he became a very rich man. On his death the flower disappeared, and the family became comparatively poor again. The Pandan Wangi very rarely flowers (indeed I have never seen the flowers of it), and the male flowers are white and sweet-scented, like those of any other Pandanus.

Recently a Javanese who was in the Botanic gardens on a moonlight evening perceived on the stem of a wild fig-tree (*Ficus Miquelii*) at a height of about ten feet from the ground, a red flower about as big as a large marigold. Not knowing the peculiarity of the Gold flower, he went to call a companion to look at it, when it immediately vanished, nor has it reappeared. It seems that the gold flower objects to a crowd, and will only be visible to certain fortunate persons, and this coolly, by calling a companion to see it and not immediately seizing the flower, has missed his opportunity of becoming a wealthy man. It is hardly necessary to say that the flowers of the fig are enclosed in the fig itself, which is mistaken for the fruit by the natives, who imagine that fig-trees have no flowers at all but only fruits. And thus, as, like the Pandan, it has normally no flowers, it is just the kind of tree you would expect to find gold flowers on.

H. N. R.

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### Remarks on the

### Rhinoceros Hornbill (*Buceros Rhinoceros*),

and some other species mentioned in Mr. Ridley's Paper on the Birds of the Botanical Gardens.

Writing of the Rhinoceros Hornbill in his interesting paper on Singapore Birds, Mr. Ridley says, "The beak and casque are naturally white, but during life are coloured orange and red. This is done by the bird itself, which every morning rubs its beak against a gland beneath its tail, whence exudes an orange-red liquid which colours the beak."

The gland (uropygial) is *above* and not *below* the tail; below is of course a *lapsus calami*. In a letter to Mr. Ridley I told him that I thought the red colour on the bill, though

fugitive, was natural to it, and not, like the yellow, put on by the bird. Mr. Ridley considered that both colours came from the oil-gland; so to settle the question I made a careful examination of the white, bleached beak of an old mounted specimen. The bill consists of a cellular bony core of extreme lightness encased in a thin covering of horn; the casque is entirely hollow, except for a mass of bony cells at the base. The horn of the outer covering is in thin flaky layers, and it is only the outer one of these which entirely loses colour in a stuffed specimen. If it be removed, the red colour is seen to be retained, though less vivid than in life, throughout the remaining layers of the horny casing. It appears, therefore, that either the outer layer of horn is naturally red and bleaches on the death of the bird, or that it is transparent when daily anointed with the uropygial oil, allowing the underlying red colour to show through, but becoming opaque in the dried specimen.

Probably the oiling of the bill, which is common to both sexes, is as much to keep the surface from cracking or becoming brittle and flaky as for decorative purposes.

*Egithina tiphia*, Mr. Ridley describes as resembling a goldfinch in its plumage and habits. The resemblance in habits is not very apparent. Goldfinches are gregarious, frequent open country, and feed on seeds, principally on thistle-down; the Iora goes in pairs or singly, keeps chiefly to secondary jungle or low trees, and feeds on insects, mainly caterpillars.

*Turnix plumipes*. Describing the decoying of these quail, Mr. Ridley says, "A cock quail is put inside the cage." Surely, a hen? It is the hens that do the courting and the fighting in the genus *Turnix*. They are also the larger and most conspicuously coloured birds. I have seen numbers trapped in India and Ceylon with hen decoys, but never saw a cock used.

*Gallinago Sthenura*. The name Mr. Ridley uses arose from a misprint. "*Stenura*" is correct, and has been shown to be what Bonaparte originally wrote, referring (*stenos*, narrow) to the attenuated lateral tail feathers. But this is merely a matter of synonymy, the least interesting part of ornithology.

A. L. Butler.

NOTE. Mr. Butler's remarks are very interesting, and speak for themselves, so I need only refer to the fighting quails. Since hearing from him, I have met several quail-catchers in Sungei Ujong, and examining the decoy birds find that all were females. The Malays too told me they always used the females for fighting, and the males did not fight.

H. N. R.

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### Bekin.

Regarding the Malay word "bikin" = to do, to make, etc., —the word which is so strongly deprecated, and the bastard origin of which is insisted upon by all authorities on the language—has the probability of its Persian origin ever been seriously considered? The word bears a striking resemblance to "bikun," the imperative of the common Persian verb "to do, to make," etc. If this origin could be established it would raise the word from its present obloquious position to one of quite classical respectability.

W. C.

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### An insectivorous squirrel.

The swarming of a nest of termites is always interesting to watch on account of the numerous enemies which hasten to the spot to prey upon these helpless insects. Birds, chiefly bulbuls, robins, drongos and bee-eaters, are the usual assailants. Dragon-flies also dart to and fro through the swarm, and frogs and toads hasten from their retreats to devour those that fall on the ground. I was surprised, however, recently on one of these occasions to see a little squirrel (*Nanosciurus exilis*) creeping about on the ground and eagerly catching the insects. On my remaining quite motionless, it crept out of the bushes upon the road where it remained about two feet from me intent on its prey, which it ate wings and all, apparently with much enjoyment, and by the rustling in the bushes I judged there was at least one more, which I could not see, attacking the swarm.

H. N. R.

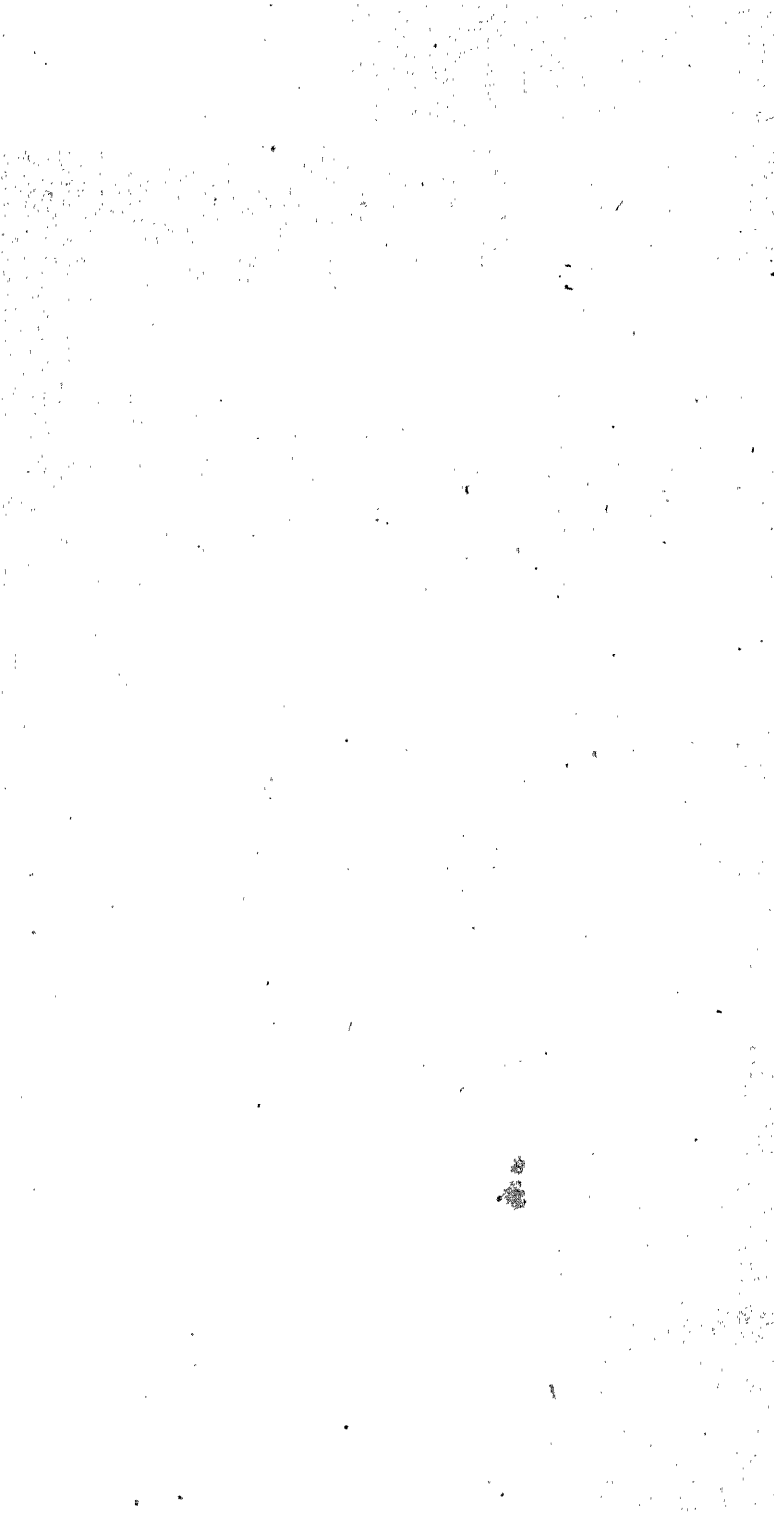
## Notes from Sarawak Museum.

### On a Fossil Tooth found at Bau, Upper Sarawak.

A molar tooth of the Indian elephant (*Elephas indicus*) was recently found in a small cave at Bau, Upper Sarawak, by a Chinaman, whilst washing for gold, and was handed over to me by Mr. Pawle of the Borneo Company, whose kindness in so doing, I beg to acknowledge here. The tooth is an undoubted fossil, as shown by a longitudinal section subsequently made, but since it was lying in a crevice in the limestone, not actually imbedded in rock, it is impossible to state with any degree of accuracy the exact horizon of the specimen. The limestone in this part of Sarawak is undoubtedly of comparatively recent origin, as shown by fossils collected by me; such characteristic shells as *Cerithium* and *Limopsis* being here abundant; the formation is honeycombed with caves, many of which were carefully explored in 1878-9 by the late Mr. A. H. Everett. His results were embodied in a report to the Royal Society (Proc. Roy. Soc. No. 203, 1880) and he there states it as his opinion, that it is unlikely that deposits of any great antiquity or interest will be found in this area; subsequent observations have justified and will, I think, continue to justify these words; the fossil tooth, the subject of this note, is interesting only because it proves conclusively that which formerly was argued inductively, *viz*:— that the Indian elephant was once an indigenous inhabitant of Borneo. In Mr. C. Hose's "Mammals of Borneo," *Elephas indicus* is included as an indigenous species; but there is little doubt that the few individuals now existing in North Borneo have sprung from some pairs which were introduced some years ago, certainly within the memory of living man. These pairs were presented by a Sultan of Pahang to the Sultan of Brunei or Sulu (for on this point accounts differ), and after they had been kept in semi-captivity for a year or two, were turned loose into the jungle. Considering the low rate of breeding of elephants it is not surprising that their present distribution in the island of Borneo is so extremely local. It is also worthy of note that the Kyans at the head of the Rejang and Baram rivers, areas in which the rhinoceros and wild buffalo

occur, are not only ignorant of the existence of the elephant both by personal observation or by hearsay, but have no word in their language for that animal. Fossil remains of various species of elephants have been found in the Pliocene and Pleistocene deposits of many countries, but *Elephas indicus* itself has not been shewn to have any great antiquity, nor do I attempt to shew it now from the fragment before me. Borneo was separated from the Asiatic continent in quite recent times, and it is not impossible that the elephant lingered on in the newly-formed island for some length of time. That the species was once indigenous to Borneo is proved now for the first time and beyond all manner of doubt.

R. S. Shelford.



*"A book that is shut is but a block"*

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